



October 2024

IT Passport Examination

Questions must be answered in accordance with the following:

| | |
|--------------------|-------------------------------|
| Question Nos. | Q1 – Q100 |
| Question Selection | All questions are compulsory. |
| Examination Time | 9:30 – 11:30 (120 minutes) |

Instructions:

1. Use a pencil. If you need to change an answer, erase your previous answer completely and neatly. Wipe away any eraser debris.
2. Mark your examinee information and your answers in accordance with the instructions below. Your answer will not be graded if you do not mark properly. Do not mark nor write on the answer sheet outside of the prescribed places.
 - (1) **Examinee Number**
Write your examinee number in the space provided, and mark the appropriate space below each digit.
 - (2) **Date of Birth**
Write your date of birth (in numbers) exactly as it is printed on your examination admission card, and mark the appropriate space below each digit.
 - (3) **Answers**
Select one answer (a through d) for each question.
Mark your answers as shown in the sample question below.

[Sample Question]

Q1. Which of the following should be used for marking your answer on the answer sheet?

- a) Ballpoint pen b) Crayon c) Fountain pen d) Pencil

Since the correct answer is “d)” (Pencil), mark the answer as below:

[Sample Answer]

| | | | | |
|----|-------------------------|-------------------------|-------------------------|------------------------------------|
| Q1 | <input type="radio"/> a | <input type="radio"/> b | <input type="radio"/> c | <input checked="" type="radio"/> d |
|----|-------------------------|-------------------------|-------------------------|------------------------------------|

**Do not open the exam booklet until instructed to do so.
Inquiries about the exam questions will not be answered.**

Company names and product names appearing in the examination questions are trademarks or registered trademarks of their respective companies. Note that the symbols ® and ™ are not used within.

Q1. Which of the following is the combination of terms or phrases to be inserted into blanks *A* through *C* in the description below concerning a method for representing information?

Data that represents information by using a continuous, variable physical volume (length, angle, voltage, etc.) is called *A* data, and data that represents information by using discrete numerical values is called *B* data. A CD that is used for the distribution of music and songs is an optical disc medium that stores information as *C* data.

| | <i>A</i> | <i>B</i> | <i>C</i> |
|----|----------|----------|----------|
| a) | analog | digital | analog |
| b) | analog | digital | digital |
| c) | digital | analog | analog |
| d) | digital | analog | digital |

Q2. Japanese restaurants in Sapporo and Japanese restaurants in Hakodate are to be searched for together. Which of the following is the logical expression that represents the search condition?

- a) (“Sapporo” AND “Hakodate”) AND “Japanese restaurant”
- b) (“Sapporo” AND “Hakodate”) OR “Japanese restaurant”
- c) (“Sapporo” OR “Hakodate”) AND “Japanese restaurant”
- d) (“Sapporo” OR “Hakodate”) OR “Japanese restaurant”

Q3. As shown in the figure below, decimal numbers 2, 5, 10, and 21 are represented using five (5) squares that are black or white.

2 □□□■□
 5 □□■□■
 10 □■□■□
 21 ■□■□■

A white square indicates 0, and a black square indicates a different positive value that is determined depending on the position of the square. The sum total of the values of the five (5) squares represents a decimal number. Which of the following is the decimal number that is represented by ■■□□□?

- a) 12
- b) 20
- c) 24
- d) 30

Q4. When a path goes from node A_1 to node C_2 in Fig. 1 and the passing nodes are counted as shown in Fig. 2, there are three shortest paths with the minimum number of passing nodes. How many shortest paths are there available to go from node A_1 to node D_4 via node C_2 ?

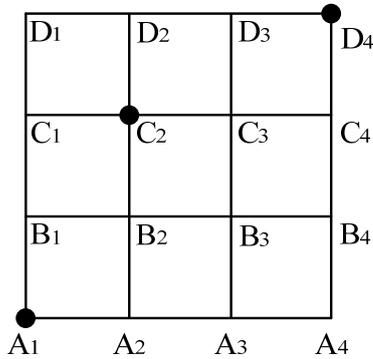
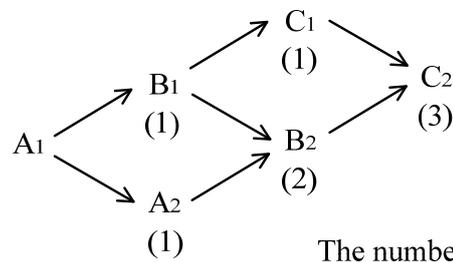


Fig. 1



The number in parentheses below a node represents the number of shortest paths from A_1 to that node.

Fig. 2

- a) 6 b) 9 c) 12 d) 20

Q5. Which of the following is an appropriate description concerning machine language?

- a) A program that is written in Fortran or C is converted into machine language and then executed.
- b) Machine language is a high-level language.
- c) Machine language expresses a program with sequences of decimal numbers.
- d) Most of application software is still programmed in machine language.

Q6. A power company charges electricity bill shown in the table below.

| Units used per month | Per unit cost (in 1/100 US\$) |
|----------------------|----------------------------------|
| First 100 units | 5 |
| Next 200 units | 10 |
| Over 300 units | 15 |

Function `computeBill` receives the number of units used per month as an argument and returns the electricity bill in 1/100 dollars. Which of the following is an appropriate combination of pieces of code to be inserted in A and B in the program?

[Program]

```

O integer: computeBill(integer: units)
integer: bill
if (units ≤ 100)
    bill ← A
elseif (units ≤ 300)
    bill ← 100 × 5 + (units - 100) × 10
else
    bill ← B
endif
return bill

```

| | A | B |
|----|---------------------------------|--|
| a) | $(\text{units} - 100) \times 5$ | $100 \times 5 + (\text{units} - 100) \times 10 + (\text{units} - 200) \times 15$ |
| b) | $(\text{units} - 100) \times 5$ | $100 \times 5 + 200 \times 10 + (\text{units} - 300) \times 15$ |
| c) | $\text{units} \times 5$ | $100 \times 5 + (\text{units} - 100) \times 10 + (\text{units} - 200) \times 15$ |
| d) | $\text{units} \times 5$ | $100 \times 5 + 200 \times 10 + (\text{units} - 300) \times 15$ |

Q7. In a markup language, with the purpose of displaying on a screen and printing, it is possible to directly embed not only the document content, but also the document structure and layout information, and the character font and size information. Which of the following is classified into such a markup language?

- a) C b) HTML c) SQL d) URL

Q8. The procedure `draw` receives a non-negative integer number `n` for input. When the value of `n` is 6, the procedure outputs the six lines shown below. Which of the following is an appropriate combination of pieces of code to be inserted in `A` and `B` in the program?

[Output]

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
1 2 3 4 5 6
```

[Program]

```
○ draw(integer: n)
integer: i, k
i ← 1
while (i ≤ n) /* The while loop is skipped if n is zero. */
  A
  while (k ≤ i)
    output the value of k and a space
  B
  endwhile
  output the line break
  i ← i + 1
endwhile
```

| | <i>A</i> | <i>B</i> |
|----|------------------------|------------------------|
| a) | <code>i ← 1</code> | <code>i ← i + 1</code> |
| b) | <code>k ← 1</code> | <code>k ← k + 1</code> |
| c) | <code>i ← i + 1</code> | <code>i ← k</code> |
| d) | <code>k ← k + 1</code> | <code>k ← i + 1</code> |

Q9. On a desk that is only large enough to place four (4) files at the same time, six (6) files, *A* through *F*, are used to perform a task. When four (4) files are already placed on the desk, the least recently used file must be placed back into the drawer before the fifth file is placed on the desk. When the files are used in the sequence *A, B, C, D, B, A, E, A, B, F*, which of the following is the last file placed back into the drawer?

- a) *A* b) *B* c) *D* d) *E*

Q10. When USB memory or other such external recordable media is connected to a PC, which of the following is an OS function that automatically executes programs or plays movies on the media and can also cause malware infection?

- a) Autocorrect b) Autocomplete
c) Auto filter d) Autorun

Q11. Which of the following is the most appropriate description concerning deep learning?

- a) It is a method for studying according to proficiency level that uses textbooks published on the Internet and is not restricted by geographical location nor time.
b) A computer analyzes a large volume of data, finds patterns, and makes inferences or decisions by itself by using a neural network.
c) An appropriate response is provided based on specialist knowledge in specific fields that are systematically categorized.
d) The level of difficulty and the knowledge and skills required of each individual to solve problems are estimated according to his/her proficiency level and understanding.

Q12. Which of the following is an appropriate description concerning a device driver that enables the use of peripheral devices with a PC?

- a) When a hard disk drive is initialized and the operating system is reinstalled, it is necessary to reinstall device drivers that were installed separately to the operating system.
- b) When new application software is installed, it is necessary to reinstall all device drivers that this software uses.
- c) Even if a device driver is no longer required, a user cannot delete the device driver once it is installed.
- d) It is only necessary to install one (1) device driver for a printer to use all printers regardless of manufacturer or model.

Q13. Which of the following is a description about a technology that improves the processing performance of a computer and is also called turbo boost?

- a) It is placed between the CPU and the main memory, and it remedies the slow performance of the main memory in reading and writing.
- b) It increases the operation frequency of the cores when the heat that the CPU generates and the power that the CPU consumes have certain margins against their limits.
- c) It provides multiple sections that serve as cores for performing calculations within the CPU, and it executes several processes simultaneously.
- d) It shares the CPUs of multiple computers, and executes a large amount of processes in a distributed manner.

Q14. Two (2) HDDs are connected to a server for storing data. When at least one (1) of the HDDs is working, stored data needs to be available. Which of the following is an appropriate configuration that should be used for the HDDs?

- a) Striping
- b) Data mining
- c) Tethering
- d) Mirroring

Q15. Which of the following is an appropriate explanation of parallel processing?

- a) It is the division of a series of processing into processing units that can be executed simultaneously, and the execution of these on multiple CPUs.
- b) It is the execution of multiple related processes that are grouped together as a single process.
- c) It is the performing of business logic and database processes on the server side, and the performing of user interface processes on the client side.
- d) It is the division of processing time for a single CPU into short units, and the sequential allocation of these to multiple applications for execution.

Q16. Which of the following includes all the appropriate measures to enable the execution of processing even in the event of a failure in part of a system?

- (1) Configuring HDDs with mirroring
- (2) Minimizing the frequency of maintenance and inspections after stable operation of the system starts
- (3) Grouping multiple redundant network lines into a single high-speed line
- (4) Making power supply redundant with the use of an uninterruptible power supply (UPS) etc.

- a) (1), (3) b) (1), (4) c) (2), (3) d) (2), (4)

Q17. It is determined whether an examinee passed or failed by evaluating the score for two (2) subjects X and Y with a spreadsheet software program. The score of each subject is entered in cells A2 and B2 of the worksheet. When passing criteria (1) or (2) is met, “Pass” is displayed in cell C2, and otherwise, “Fail” is displayed. Which of the following is the expression that is entered in cell C2?

[Passing criteria]

- (1) The total for Subject X and Subject Y is 120 or more.
- (2) The score for either Subject X or Subject Y is 100.

| | A | B | C |
|---|-------------|-------------|-----------|
| 1 | Subject X | Subject Y | Pass/Fail |
| 2 | 50 | 80 | Pass |

- a) $\text{IF}(\text{AND}((\text{A2}+\text{B2}) \geq 120, \text{A2} = 100, \text{B2} = 100), \text{'Pass'}, \text{'Fail'})$
- b) $\text{IF}(\text{AND}((\text{A2}+\text{B2}) \geq 120, \text{A2} = 100, \text{B2} = 100), \text{'Fail'}, \text{'Pass'})$
- c) $\text{IF}(\text{OR}((\text{A2}+\text{B2}) \geq 120, \text{A2} = 100, \text{B2} = 100), \text{'Pass'}, \text{'Fail'})$
- d) $\text{IF}(\text{OR}((\text{A2}+\text{B2}) \geq 120, \text{A2} = 100, \text{B2} = 100), \text{'Fail'}, \text{'Pass'})$

Q18. Among the descriptions A through C below concerning Open Source Software (OSS), which of the following is the list that contains all and only the appropriate descriptions?

A : Source code can be modified and redistributed.

B : It is free to obtain source code, but maintenance support for a fee must be used.

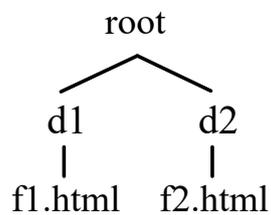
C : The copyright is waived, and it can be used without permission.

- a) A
- b) A, C
- c) B
- d) C

Q19. When directories d1 and d2 are placed on a web server as shown in the figure, which of the following descriptions specifies the reference of the web page file f2.html on directory d2 from the web page file f1.html on directory d1 (current directory)? Here, the reference method of files is as follows.

[Reference method]

- (1) A file is referenced as “directory name /.../ directory name / file name”, where the directory names on the path are listed and separated with “ / ” in sequence, followed by a “ / ” and the file name.
- (2) The current directory is represented by “.”.
- (3) The directory one (1) level above is represented by “..”.
- (4) When a reference begins with a “ / ”, it is assumed that the root directory is omitted from the beginning of the reference.



- | | |
|------------------|------------------|
| a) ./d2/f2.html | b) ./f2.html |
| c) ../d2/f2.html | d) d2/../f2.html |

Q20. The tax-inclusive prices of products *A* and *B* are calculated by using two (2) tax rates that are set in cells D2 and E2 below. The correct expression that should be entered in cell D4 is $\$B4*(1.0+D\$2)$, but a wrong expression $\$B4*(1.0+\$D\$2)$ was entered. When the expression that was entered in cell D4 is copied to cells D5, E4, and E5, which of the following is the numeric value that is displayed in cell E5?

| | A | B | C | D | E |
|---|------------------|---------------------|----------|-----------------------|-----------------------|
| 1 | | | | Tax rate 1 | Tax rate 2 |
| 2 | | | Tax rate | 0.05 | 0.1 |
| 3 | Product name | Tax-exclusive price | | Tax-inclusive price 1 | Tax-inclusive price 2 |
| 4 | Product <i>A</i> | 500 | | | |
| 5 | Product <i>B</i> | 600 | | | |

- a) 525 b) 550 c) 630 d) 660

Q21. Which of the following is a web browser that is Open Source Software (OSS)?

- a) Apache b) Firefox c) Linux d) Thunderbird

Q22. Which of the following is an OS function that executes multiple application programs concurrently on a single PC, such as when a file is downloaded from a website while data is processed with spreadsheet software?

- a) Virtual reality b) Dual core c) Dual system d) Multitasking

Q23. Which of the following is an explanation of the printing method of an inkjet printer?

- a) Printing is performed by directly spraying fine ink particles onto the paper.
 b) Printing is performed by using printing pins or other such component to hit an ink ribbon against the paper.
 c) Printing is performed by using the print head to heat ink that melts when it is heated.
 d) Printing is performed by using laser light to make toner adhere to a photosensitive body.

Q24. Which of the following is the copyright protection technology that is used for a DVD-R and an SD card, and allows digital content to be duplicated to recording media only once?

- a) AR b) CPRM c) HDMI d) MIDI

Q25. Which of the following is the unit that represents the resolution when a photograph or a picture is read by a scanner?

- a) dpi b) fps c) pixel d) ppm

Q26. From a “Product” table and “Sales” table that are managed with a relational database, which of the following contains all and only the products where the total sales for each product in May is at least 20,000 yen?

Product

| ProductCode | ProductName | Price (yen) |
|-------------|-------------|-------------|
| 0001 | Product A | 2,000 |
| 0002 | Product B | 4,000 |
| 0003 | Product C | 7,000 |
| 0004 | Product D | 10,000 |

Sales

| SalesNumber | ProductCode | Quantity | SalesDate | DeliveryDate |
|-------------|-------------|----------|-----------|--------------|
| Z00001 | 0004 | 3 | 4/30 | 5/2 |
| Z00002 | 0001 | 3 | 4/30 | 5/3 |
| Z00005 | 0003 | 3 | 5/15 | 5/17 |
| Z00006 | 0001 | 5 | 5/15 | 5/18 |
| Z00003 | 0002 | 3 | 5/5 | 5/18 |
| Z00004 | 0001 | 4 | 5/10 | 5/20 |
| Z00007 | 0002 | 3 | 5/30 | 6/2 |
| Z00008 | 0003 | 1 | 6/8 | 6/10 |

- a) Product A, Product B, Product C
 b) Product A, Product B, Product C, Product D
 c) Product B, Product C
 d) Product C

Q27. Which of the following is a language used for the operation of a relational database?

- a) FAQ b) SQL c) SSL d) UML

Q28. Which of the following is an appropriate description concerning foreign keys in a relational database?

- a) A property held by the foreign key is called a unique constraint.
b) Duplicate values cannot be set in the fields that are set as foreign keys.
c) Multiple foreign keys can be defined in a single table.
d) Multiple fields cannot be collectively set as a single foreign key.

Q29. When designing a database, which of the following is used for the purpose of organizing and representing the relation of data?

- a) E-R diagram b) Arrow diagram
c) Gantt chart d) Flowchart

Q30. Which of the following is the appropriate combination of terms or phrases to be inserted into blanks *A* and *B* in the description below concerning NAT?

NAT is often used when an office or a household LAN is connected to the Internet, and it converts between and .

| | <i>A</i> | <i>B</i> |
|----|----------------------|---------------------|
| a) | private IP addresses | a MAC address |
| b) | private IP addresses | a global IP address |
| c) | host names | a MAC address |
| d) | host names | a global IP address |

Q31. When another network such as the Internet is accessed from a network in an office or a household, which of the following fulfills the role of an entrance or an exit to the other network?

- a) Splitter
- b) Default gateway
- c) Hub
- d) Repeater

Q32. Which of the following is an appropriate description concerning encryption of communication when a website with the URL beginning with “https://” is browsed through a PC browser?

- a) Only the communication from the PC to the web server is encrypted.
- b) Only the communication from the web server to the PC is encrypted.
- c) The bi-directional communication between the web server and PC is encrypted.
- d) The direction in which communication will be encrypted depends on the settings of the web server.

Q33. When transmitted over the Internet, data is divided into blocks, each of which is transmitted with a header that specifies the destination, the block number, and an error detecting code. Which of the following is the term for such blocks of data?

- a) Domain
- b) Packet
- c) Port
- d) Router

Q34. A DHCP server has been installed in a LAN. When a PC that automatically acquires information from the DHCP server is to be connected to the LAN, which of the following will be set in the PC?

- a) IP address
- b) Latest virus definition file
- c) Address list of spam mail
- d) Mail addresses assigned by the Internet service provider

Q35. Which of the following is the appropriate example of biometric authentication?

- a) Displaying an image of characters that are difficult for a machine to read on a monitor, and having a person read the characters and enter them
- b) Having a person enter a password via a software keyboard that is displayed on a touch panel
- c) Reading the trail, pressure, and other characteristics of the action when a touch pen is used for a signature
- d) Having a person answer a question that only the person knows the answer to

Q36. When a document file attached to a received e-mail is opened on a PC, the PC begins to behave abnormally. Which of the following is an appropriate suspected attack?

- a) SQL injection
- b) Cross-site scripting
- c) Shoulder hacking
- d) Macro virus

Q37. Which of the following is the activity in A (Act) phase in the PDCA model adopted in an organization that operates an ISMS?

- a) Deciding to make improvements concerning matters such as flaws that are revealed through the monitoring of operational status and the measurement and evaluation of operational results
- b) Monitoring operational status, and measuring and evaluating operational results
- c) Creating a security policy, establishing an organizational structure, and creating a procedure for achieving the targets that are defined in the security policy
- d) Communicating the security policy to employees, installing security equipment and other security measures, and operating them

Q38. Which of the following is an example of an aim of an attacker who infects someone else's PC with ransomware?

- a) To obtain personal information on the PC via a network
- b) To make files on the PC unusable, and to obtain money in exchange from unlocking them
- c) To obtain characters typed with the PC keyboard via a network
- d) To operate the PC without the user's permission by sending instructions for operations via a network

Q39. A private key and a public key were generated as a key pair and a digital certificate for the public key was issued. Which of the following is an appropriate action that should be taken when the private key is leaked?

- a) Reissuing the digital certificate with the same key pair
- b) Requesting to the certification authority for revocation of the digital certificate
- c) Creating a new key pair for reissuing a certificate due to the expiration of the validity period
- d) Continuing using the same digital certificate, because only the private key was leaked

Q40. Which of the following sets conditions for character type, length, etc. used for passwords that are set for accounts on a computer, etc.?

- a) Single sign-on
- b) Password crack
- c) Password policy
- d) One-time password

Q41. Among confidentiality, integrity, and availability, which of the following is the list that contains all and only the properties that are lost in the information security incident below?

All files on a server in the workplace were encrypted. However, the server was infected by a virus, and a number of the files were deleted. Removal of the virus and recovery of the files required several hours. During the hours, work could not be performed, and users were inconvenienced. Some files were unable to be recovered.

- a) Confidentiality
- b) Confidentiality, integrity
- c) Integrity, availability
- d) Availability

Q42. A problem has been pointed out that the WEP encryption for wireless LANs can be broken easily. Which of the following is an encryption method that does not have the same weakness and is cryptographically stronger?

- a) ESSID
- b) S/MIME
- c) SSL
- d) WPA2

Q43. Company *A* implements risk analysis for its own information assets. The results show that if a nearby river overflows, the server room on the first floor of the company might be flooded. The company considers the possibility of moving the server room, but decides there is almost no risk of a flood because the last time the river overflowed was 100 years ago, and the management decides that no particular countermeasures are taken. Which of the following is the risk treatment for information security that Company *A* selects?

- a) Risk transfer
- b) Risk avoidance
- c) Risk acceptance
- d) Risk mitigation

Q44. The decision is made to digitize a paper-based contact list that only some people are permitted to view, and to manage it as a contact file. Among the measures *A* through *D* below, which of the following is the list that contains all and only the appropriate measures against personal information leakage?

- A* A password for reading is set for the contact file.
- B* The contact file is encrypted.
- C* The servers that stores the contact file are configured in a redundant configuration.
- D* After the contact list is digitized, the paper-based contact list is disposed of with a shredder.

- a) *A, B* b) *A, B, C* c) *A, B, D* d) *C, D*

Q45. Among the Web browsing practices (1) through (3) below, which of the following is the list that contains all and only the practices that reduce security risks?

- (1) Storing the user ID and the password on the web browser
- (2) Disabling JavaScript
- (3) Logging on to the PC with administrator privileges when using the web browser

- a) (1), (2) b) (1), (3) c) (2) d) (2), (3)

Q46. In software development, which of the following is the appropriate combination of the descriptions *A* through *C* concerning testing and testing processes?

- A*: Check that processing ends within the planned operating time.
- B*: Check the interface between software.
- C*: Comprehensively check the internal paths of a program.

| | Unit test | Integration test | System test |
|----|-----------|------------------|-------------|
| a) | <i>A</i> | <i>B</i> | <i>C</i> |
| b) | <i>A</i> | <i>C</i> | <i>B</i> |
| c) | <i>B</i> | <i>A</i> | <i>C</i> |
| d) | <i>C</i> | <i>B</i> | <i>A</i> |

Q47. Which of the following corresponds to software maintenance?

- a) A response time that was measured in a system test did not satisfy the requirement, so tuning was performed on the software.
- b) As a result of a software acceptance test, a defect was found, so the orderer requested the developer to fix the software.
- c) A function was found missing in a unit test of a program, so the function was added to the program.
- d) A defect was reported on software that is running on a production system, so the software was modified.

Q48. Which of the following is an appropriate test for a user to confirm by himself/herself whether the delivered software satisfies the requirements?

- a) Acceptance test
- b) Integration test
- c) System test
- d) Unit test

Q49. A system migration plan was created for the migration from an existing system to a new system. Which of the following is an appropriate item to be described in the system migration plan?

- a) System selection policy
- b) Schedule for parallel operation of the existing and new systems
- c) Evaluation criteria for the quality of the deliverables
- d) The work history of project members

Q50. Which of the following is the appropriate explanation of refactoring?

- a) Improving internal architecture without changing the functions that software provides
- b) Discovering the specifications of software by analysis of its operations, etc.
- c) Correcting a defect in software so that it performs according to the specifications
- d) Modifying software to add a new function on the basis of user requests, etc.

Q51. Among the descriptions *A* through *D* below concerning project management in system development, which of the following lists all and only the failures in scope management?

A: The labor costs incurred in development were underestimated, so the budget was exceeded.

B: The time required for development work was set short, so development could not be completed within the planned period.

C: A project was started without first deciding the function to be created, so the development period is exceeded.

D: Several activities that should be implemented in a project were omitted from the plan, so the system could not be completed.

a) *A, B*

b) *B, C*

c) *B, D*

d) *C, D*

Q52. For software development work, a plan is created to complete it with 10 people in a period of 15 days. However, it became known that only eight (8) members of staff could be obtained for the first five (5) days. In order to complete the work in 15 days as planned, how many staff members are required from the 6-th day? Here, the productivity of each member of staff is the same.

a) 10

b) 11

c) 12

d) 14

Q53. Which of the following is the most appropriate description concerning risk management in a project?

a) Since a project has a predetermined deadline, all risks must be identified at the start of the project.

b) Since the realization of a risk has a negative impact to a project, risk measures are planned to avoid all risks.

c) In order to plan risk measures, risks are prioritized on the basis of the likelihood of occurrence of an event and its consequences.

d) In order to cut down the cost involved in taking action against a risk, risk measures are planned whenever a risk is realized.

Q54. A company orders information system development to an overseas software developer under a contract for software development. Which of the following is an appropriate activity to be performed by the company in project procurement management?

- a) When a defect is found after the acceptance of delivery, even if not indicated in the contract, the company asks the developer to examine not only the defect but similar defects and fix them.
- b) In order to make good use of the capabilities of the developer, the company does not include the provisions of intellectual property rights in the contract.
- c) After the start of development, the company has the procurement detail such as the development scope, specifications, and work contents, etc. agreed upon by the developer in writing.
- d) At the time of signing the contract, the company agrees upon in writing with the developer the documents to be delivered and the rules for changing specifications during development.

Q55. Which of the following is a method to break down the required activities into a hierarchical structure in software development?

- a) CMM
- b) ITIL
- c) PERT
- d) WBS

Q56. Quality management in system development projects has a quality planning process to define quality requirements and quality standards for deliverables and to specify the methods for achieving them. Which of the following is an appropriate description concerning the quality planning process?

- a) If deliverables are not exactly the same as those of past system development projects, past quality standards cannot be used as reference.
- b) Since schedules have the highest priority in all projects, it is acceptable to shorten the period for reviewing and testing for achieving target quality.
- c) Quality should have the highest priority in all projects, and, to enhance the quality of deliverables, constraints should not be placed on the budget.
- d) The effects such as reductions in reworking, improvement in productivity, improvement of stakeholder satisfaction brought about by achieving targeted quality, and the required costs are to be compared.

Q57. In a project, a contingency reserve is the cost that is included in the initial project scope and is prepared for events that are predictable but uncertain. Among the costs that are allocated by the project manager of a company that receives an order for a system development, which of the following is an appropriate cost that can be classified as a contingency reserve?

- a) The cost that is necessary for the replacement of a device when the device happens to fail under the development environment
- b) The cost that is necessary for the activities of the project leader who manages the development progress
- c) The cost that is necessary for fulfilling the new requirements of users that are outside the scope of the project
- d) The cost that is necessary for purchasing the quality management tools of a system that are planned to be adopted in the project

Q58. In a service desk that acts as the point of contact for users, a tool that uses automated response technology is used in addition to telephone and e-mail. Which of the following is the most appropriate example of such a tool?

- a) FAQ
- b) RPA
- c) Escalation
- d) Chatbot

Q59. Which of the following is an appropriate requirement for the availability of an e-mail service in IT service management?

- a) Allowing the e-mail service to be used with only a web browser
- b) Allowing the e-mail service to be used anytime except for defined maintenance hours
- c) Preventing e-mails addressed to a user from being read by another user without permission
- d) Preventing sent e-mails from being falsified

Q60. Which of the following is an appropriate purpose of providing FAQ to users in IT service management?

- a) Providing a framework of IT service management
- b) Defining a target value for the service level on the sides of both service provider and users
- c) Establishing a single point of contact for users to make all kinds of queries concerning the service
- d) Supporting users so that they can solve problems by themselves

Q61. Among the descriptions *A* through *D* below, which of the following lists all and only the activities of facility management?

A: Management of entry and exit to and from the building in which computers are installed

B: Installation and update management of anti-malware software on the company's PCs

C: License management of the software constituting the information system

D: Installation of an uninterruptible power supply (UPS) to prevent loss of data during a power cut

- a) *A, C* b) *A, D* c) *B, D* d) *C, D*

Q62. Which of the following is an appropriate example of criteria for evaluating the service level of a service desk that receives queries from system users over the telephone?

- a) Cost of the service
- b) Number of system failures
- c) Availability of the system
- d) Response time for queries

Q63. Which of the following is an appropriate explanation of monitoring in internal control?

- a) It is a process of continuously evaluating if internal control is working effectively.
- b) It is a process of promoting compliance to the laws and other regulations concerning internal control.
- c) It is a process of establishing an organization for internal control.
- d) It is a process of analyzing the risks that hinder internal control.

Q64. Which of the following is an appropriate measure to enable internal controls?

- a) Preventing creation of a job description indicating the scope of work and roles
- b) Preventing creation of a work handover document for a successor
- c) Preventing processing of purchasing and payment by the same person
- d) Preventing separation of team members for system development and system operation

Q65. Which of the following is an appropriate description of the roles of a system auditor?

- a) Preparing a workflow, work description, and risk control matrix that reflect the flow and business operations, evaluating the risks, and installing an appropriate system
- b) Installing a mechanism for appropriate monitoring and self-inspection in each process of planning, development, operation, and maintenance of the information system, and taking actions to operate the information system smoothly
- c) Verifying whether or not the risks of the information system are controlled appropriately and effectively from a standpoint that is independent of the department being audited, and reporting the result to the client
- d) Specifying the policies and objectives, and establishing a management system so that the risks of the information system are controlled appropriately

Q66. Company *A* is a large company with multiple offices nationwide, and it created BCP that envisaged the total destruction of the head office building in a large natural disaster. In consideration of the purpose of the BCP, which of the following is Company *A*'s most appropriate BCP?

- a) In order to prevent damage by a fire that occurs after a disaster, replacing curtains and other such things with flame-resistant products and planning regular checks of fire prevention equipment
- b) In order to swiftly respond to instructions from the head office when a disaster occurs, establishing a procedure to completely halting work at all offices and have all employees standby until an instruction is received from the head office
- c) In order to continue business after a natural disaster, specifying an office to take over the functions of the head office, narrowing down the important work that needs to be dealt with, and establishing an implementation procedure for this work
- d) Incorporating insurance premiums for the head office building into the annual budget, and preparing for a relocation to a building with the same scale as the current head office

Q67. Which of the following is an explanation of a balance sheet?

- a) It displays the status of cash flow in a fixed period of time by activity category.
- b) It displays the management performance of a company by the income and cost generated in a fixed period of time.
- c) It displays the previous term-end balance, changes during the year, and the current term-end balance for each item of net assets of a company.
- d) It displays the financial condition of a company on the date of settlement on the basis of the categories of assets, liabilities, and net assets.

Q68. The operating profit when the sales quantity of a product is 700 units is as shown in the table below. When the unit sales price is reduced by 20% to expand sales, the sales quantity increases by 20%. How much, in yen, is the operating profit at this time? Here, the variable cost per one (1) unit of the product does not change.

| | | Unit: Yen |
|------------------|--|-----------|
| Total sales | | 700,000 |
| Cost | | |
| Variable cost | | 140,000 |
| Fixed cost | | 300,000 |
| Operating profit | | 260,000 |

- a) 200,000 b) 204,000 c) 260,000 d) 320,000

Q69. Among the phases of the PDCA cycle in corporate business operations, which of the following measures and evaluates the status of operations on the basis of KPI?

- a) P b) D c) C d) A

Q70. Data of the defects and faults of products, complaints from customers, etc. are categorized according to their cause and situation. Which of the following represents the number of data in each category in descending order on a bar graph and the cumulative total on a line graph?

- a) Control chart
- b) Tree diagram
- c) Pareto chart
- d) Matrix chart

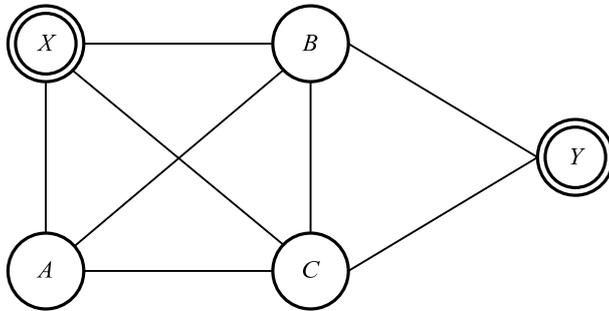
Q71. When the purchase and sales of a product in April are as in the table below, what is the inventory value in yen for the product at the end of April according to the moving average method? The moving average method calculates the average unit price of products in the inventory each time a purchase is made, and uses the average unit price for products in the inventory immediately beforehand for the calculation of the inventory value.

| Date | Note | Replenishment | | | Shipping | | | Inventory | | |
|----------|------------|-----------------|------------------|-------------|-----------------|------------------|-------------|-----------------|--------------------------|-------------|
| | | Quantity (unit) | Unit price (yen) | Total (yen) | Quantity (unit) | Unit price (yen) | Total (yen) | Quantity (unit) | Average unit price (yen) | Total (yen) |
| April 1 | Carry over | 100 | 10 | 1,000 | | | | 100 | 10 | 1,000 |
| April 8 | Purchase | 100 | 14 | 1,400 | | | | 200 | 12 | 2,400 |
| April 18 | Sales | | | | 150 | | | 50 | | |
| April 29 | Purchase | 50 | 16 | 800 | | | | 100 | | |

Note: The shaded parts are not shown.

- a) 1,280
- b) 1,300
- c) 1,400
- d) 1,500

Q72. A person wishes to start at point X , pass through all of points A , B , and C , and arrive at point Y . When the routes and the required times between points are as shown in the figure and the table, what is the shortest time in minutes from point X to point Y ? Here, the points A , B , and C may be passed through in any order.



Unit: minutes

| | | Ending point | | | |
|----------------|-----|--------------|-----|-----|--------------|
| | | A | B | C | Y |
| Starting point | X | 20 | 20 | 40 | Not possible |
| | A | - | 40 | 30 | Not possible |
| | B | 40 | - | 20 | 60 |
| | C | 30 | 20 | - | 60 |

- a) 110 b) 130 c) 140 d) 150

Q73. Which of the following is the most appropriate description of NDA?

- a) It is a specialized organization that monitors and analyzes threats to the information systems in a company, etc.
- b) It is a contract that makes the contracting parties agree to hold and maintain in confidence the confidential information of the other party.
- c) It is an agreement of an objective quality standard that is concluded between a service provider and the user concerning the service provided.
- d) It is a hierarchical decomposition of the tasks to be implemented in a project.

Q74. Which of the following is a code that stores information in a vertical and horizontal two-dimensional pattern?

- a) ASCII code
- b) G-code
- c) EAN code
- d) QR code

Q75. Concerning the EU's General Data Protection Rules (GDPR), which of the following lists all and only the appropriate descriptions?

- A:* If a business has an office within the EU region and provides data and services within the EU region, it is subject to the rules.
- B:* If a business has an office within the EU region and provides data and services to Asia, the US, or other such places outside of the EU region, it is not subject to the rules.
- C:* If a business does not have an office within the EU region and provides data and services only to Asia, the US, or other such places outside of the EU region, it is not subject to the rules.
- D:* If a business does not have an office within the EU region and provides data and services from Asia, the US, or other such places to the EU region, it is not subject to the rules.

- a) *A*
- b) *A, B, C*
- c) *A, C*
- d) *A, C, D*

Q76. Among company's actions *A* through *C* below, which of the following lists all and only the acts that may be problematic in terms of compliance?

A: In order to increase awareness of the name of a new product among consumers, a campaign is implemented where anyone can apply for a prize by answering a simple quiz that just asks a part of the product name is published widely in media such as newspapers, the relevant company's website, and magazines, and one of the applicants is chosen at random to receive a prize of 100,000 yen.

B: When a company received an order for an advertisement from an advertiser, the company posted an article on its popular website as a general article that favorably reviews a certain product without indicating that the article is an advertisement.

C: A bag with a design inspired by France was manufactured domestically and was put on sale with a tag featuring a photograph of Paris and the French flag, but without noting the country of production.

a) *A, B*

b) *A, B, C*

c) *A, C*

d) *B, C*

Q77. Which of the following is appropriate as an expected advantage of the adoption of ISO 9001 by companies?

a) The companies' trade procedures will be standardized, leading to increased efficiency and the avoidance of non-tariff barriers.

b) Technical specifications will be standardized in the industry, and increase in product quality and expansion of markets will move forward.

c) Methods for handling information assets will be standardized and the quality of information security will increase.

d) Business operations concerning quality management will be standardized, and the quality and efficiency of management will increase.

Q78. Which of the following is an organization in the USA that promotes standardization activities concerning Ethernet LAN and wireless LAN, etc.?

a) ICANN

b) IEEE

c) ISO

d) W3C

Q79. Which of the following is the most appropriate marketing strategy for narrowing down the customer base to focus on by classifying customers on the basis of age, gender, family structure, and the like, and analyzing the purchasing behaviors of each group?

- a) Service marketing
- b) Segment marketing
- c) Social marketing
- d) Mass marketing

Q80. There are two (2) indicators for evaluating the achievement of strategic goals. These are leading indicators that evaluate the means for achieving the goals, and result indicators that evaluate the degree of goal achievement. If a strategic goal is “acquire new customers,” which of the following is an appropriate leading indicator?

- a) Sales increase amount
- b) New contract acquisition ratio
- c) Total customer increase ratio
- d) Number of visits to prospective customers

Q81. Which of the following is the most appropriate explanation of user experience (UX)?

- a) The design of a software product with consideration that it is easy to use for as many people as possible, including mainly elderly people and disabled people
- b) A method of identifying customers on the basis of analysis of customer data, and deepening relationships with customers by using channels such as call centers and the Internet
- c) A software product’s capability that enables efficient use by a user under specified conditions
- d) People’s feelings and responses that are gained through the use of a product, system, or service

Q82. Which of the following is a system that centrally manages the process from materials procurement to product sales, and aims for the optimization of supply?

- a) ASP
- b) CRM
- c) ERP
- d) SCM

Q83. Company *A* performs analysis of its positioning with competitors. In order for Company *A* to obtain the best evaluation of all three (3) companies, what is the minimum number of points required in the brand evaluation item?

The minimum value of evaluation item is one (1) point and the maximum value is ten points, and each company is evaluated by using the total value of each weighted evaluation item.

| Evaluation item | Weight | Company <i>A</i> | Company <i>B</i> | Company <i>C</i> |
|-----------------|--------|------------------|------------------|------------------|
| Selling power | 1 | 10 | 9 | 6 |
| Price | 4 | 10 | 7 | 9 |
| Quality | 3 | 6 | 10 | 7 |
| Brand | 2 | | 6 | 10 |

Note: The shaded part is not shown.

- a) 6 b) 7 c) 8 d) 9

Q84. Which of the following is the most appropriate as the underlying concept of CRM?

- a) The source of profit is an early entry into a market with little competition.
- b) The source of profit is a good relationship with the customer.
- c) The source of profit is a shorter product life cycle.
- d) The source of profit is a large share in a specific market.

Q85. Which of the following is a technique that increases the potential for success in the development of a new business model or product, by creating the minimum service or product on the basis of a hypothesis, and performing repeated verification of customer value in a short interval of times?

- a) Cannibalization
- b) Business operations modeling
- c) Digital transformation
- d) Lean startup

Q86. In call handling at a call center, which of the following is the most appropriate example of the use of AI to implement a more effective FAQ system?

- a) As part of the training for operators, examples of questions and answers that use the existing FAQ are taught on a web screen.
- b) According to the numbers that are entered according to the guidance, a call is assigned to an operator with responsibility for the relevant FAQ item.
- c) From the caller's telephone number of a received call, customer information and a record of the content and response of past inquiries are retrieved from a customer information database and displayed on the operator's screen.
- d) In call handling, emotion and intent are determined from the audio of a question in order to increase the certainty of selection of the optimum candidate response from the FAQ.

Q87. Which of the following is a business objective that becomes possible to achieve with "the introduction of a POS system"?

- a) Improvement in the work productivity of salespersons and organizational strength of the sales department
- b) Reduction in inventory volume of component parts and partly finished goods
- c) Optimization of the series of processes from procurement to manufacturing, shipment, and sales
- d) Improvement in the selection of goods at each store and streamlining of ordering and inventory control

Q88. Which of the following is an appropriate explanation of CAD, as used in the manufacturing industry?

- a) It calculates the required quantity of materials for a product manufacturing plan and orders materials.
- b) It manages information about the components, semi-finished products, quantities, etc. required for the manufacture of products.
- c) It performs unified management of information such as product blueprints and component tables, from design to manufacturing.
- d) It uses computers in product design to improve the productivity and reliability of design specifications.

Q89. Which of the following is an appropriate case example that corresponds to traceability?

- a) Taking advantage of the Internet and web technology for the use of computers in education
- b) Outsourcing all software development to an external specialized company without placing any development department within one's own company
- c) Sharing knowledge and information among employees across the entire organization, and utilizing it effectively to improve business performance
- d) Being able to check the history from production up to sales on the basis of the labels pasted on meat and fish products

Q90. Which of the following is classified as a "B to E" transaction?

- a) A company provides services, such as welfare and education for the company's own employees, through the Internet.
- b) A travel company uses the Internet to give campaign information and sell tickets to consumers in advance.
- c) An automobile manufacturer uses the Internet to procure components and materials from vendors across the world.
- d) In an auction held on the Internet, a participant buys a product from another participant.

Q91. A single unit of Product *A* is composed of three (3) pieces of Part *B* and two (2) pieces of Part *C*. In the production plan for a particular period, when the demand for Product *A* is 10, which of the following is the net requirement of Part *B*? Here, the quantity in stock is five (5) for Part *B*, and there are no other pieces in stock, in process, on back order, or already allocated. The net requirement is calculated by subtracting the stock available for allocation from the gross requirement.

- a) 20 b) 25 c) 30 d) 45

Q92. When the spreadsheet shown below is converted into CSV format, which of the following is an appropriate list of data that is generated by spreadsheet software? Here, records are separated by the carriage return code “ C_R ”. The expression in a cell is automatically recalculated, and the resulting value is written back into that cell. Although the entered expressions are shown in row 3 and column C below, the resulting values are actually displayed on the screen.

| | A | B | C |
|---|-------|-------|-------|
| 1 | 2 | 7 | A1+B2 |
| 2 | 6 | 4 | A2+B1 |
| 3 | A1+A2 | B1+B2 | C2+B3 |

- a) 2 , 6 , 8 C_R 7 , 4 , 11 C_R 6 , 13 , 24 C_R
- b) 2 , 6 , 8 C_R 7 , 4 , 11 C_R 9 , 10 , 19 C_R
- c) 2 , 7 , 6 C_R 6 , 4 , 13 C_R 8 , 11 , 24 C_R
- d) 2 , 7 , 9 C_R 6 , 4 , 10 C_R 8 , 11 , 19 C_R

Q93. Which of the following is the most appropriate utilization of RPA for a company?

- a) The adoption of an important strategy by management, such as an M&A
- b) The provision of a service that matches personal tastes
- c) The identification of patterns in large volumes of behavioral data concerning potential customers
- d) The streamlining of routine administrative work

Q94. Which of the following is the most appropriate description concerning the analysis of big data?

- a) In order to forecast unknown circumstances, analysis that uses machine learning in addition to statistical analysis is also effective.
- b) Non-textual data in the form of video, images, and audio data cannot be in the scope of analysis.
- c) Only information that spreads by humans, such as comments on an electronic bulletin board, social media messages, and website search history, is used in the analysis of human actions.
- d) Data that is not intended to be analyzed, such as a blog entry, is out of the scope regardless of the purpose of analysis.

Q95. Which of the following analysis techniques used in Enterprise Architecture (EA) clarifies the issues by comparing the ideal situation with the current situation?

- a) Gap analysis
- b) Core competence analysis
- c) Value chain analysis
- d) Pareto analysis

Q96. Which of the following is “cloud computing”?

- a) One of the Internet communication protocols
- b) One of the service models for providing computer resources
- c) One of the software development methods for flexibly supporting changes in the specification
- d) One of the electronic data exchange standards for electronic commercial transactions

Q97. Which of the following is the most appropriate description of the Fourth Industrial Revolution?

- a) The Internet and AI are utilized in a wide range of fields in daily life, such as medical care, infrastructure, and traffic systems, and service automation and quality improvement are achieved.
- b) Production automation and labor cost reduction are achieved by the introduction to factories of industrial robots that utilize electronics.
- c) Mass production of industrial products is performed by the construction of production lines that use conveyor belts in factories.
- d) Productivity is increased compared to manual work by the use of steam energy as the driving force for machinery in light industry, such as sewing machines.

Q98. At power companies, the amount of electricity consumed by each household is measured remotely by communicating with electrical meters that are connected to the Internet, instead of measured by meter readings by a person. Which of the following is a term that represents the mechanism where a range of devices are connected to the Internet and utilize information in cases such as this?

- a) EDI
- b) IoT
- c) ISP
- d) RFID

Q99. Which of the following are international development targets that are composed of 17 objectives set by the United Nations in order to achieve a sustainable world?

- a) COP28
- b) SDGs
- c) UNESCO
- d) WHO

Q100. A company planning the development of a business information system decided to present an RFP to SIers. Which of the following must be described in the RFP at a minimum?

- a) The development schedule
- b) The functions that should be implemented in the business information system
- c) The method for achieving the business information system
- d) The project team

Pseudo programming language notations

In algorithm and programming questions that use pseudo programming language, the following notations are used unless otherwise stated:

[Pseudo programming language notations]

| Notation | Description |
|--|---|
| \bigcirc <i>procedure</i> (<i>type</i> : <i>arg1</i> , ...) | Declares a <i>procedure</i> and its argument(s) <i>arg1</i> , |
| \bigcirc <i>ret-type</i> : <i>function</i> (<i>type</i> : <i>arg1</i> , ...) | Declares a <i>function</i> , its argument(s) <i>arg1</i> , ... , and type of return value <i>ret-type</i> . |
| <i>type</i> : <i>var1</i> , ... <i>type</i> []: <i>array1</i> , ... | Declares variables <i>var1</i> , ... and arrays <i>array1</i> , ... by data <i>type</i> such as integer, real, and string. |
| <i>/* comment */</i> | Describes a comment between <i>/*</i> and <i>*/</i> . |
| <i>// comment</i> | Describes a comment after <i>//</i> till end of line. |
| <i>variable</i> ← <i>expression</i> | Assigns the value of the <i>expression</i> to the <i>variable</i> . |
| <i>procedure</i> (<i>arg1</i> , ...) | Calls a <i>procedure</i> by passing arguments <i>arg1</i> , |
| <i>function</i> (<i>arg1</i> , ...) | Calls a <i>function</i> by passing arguments <i>arg1</i> , ... , and receiving the return value. |
| output <i>arg1</i> , ... | Outputs values of <i>arg1</i> , ... to a printing device. |
| return <i>ret-val</i> | Finishes a function by passing back a return value <i>ret-val</i> . |
| <pre> if (<i>condition-i</i>) } *1 <i>process-i</i> elseif (<i>condition-ei</i>) } *2 <i>process-ei</i> else } *3 <i>process-e</i> endif </pre> | <p>Indicates the selection process.</p> <p>*1 If <i>condition-i</i> is true, then execute <i>process-i</i>. Otherwise, proceed to the next elseif or else.</p> <p>*2 If <i>condition-ei</i> is true, then execute <i>process-ei</i>. Otherwise, proceed to the next elseif or else.</p> <p>*3 If all conditions are false, execute <i>process-e</i>.</p> <p>Note: *2 and *3 can be omitted. *2 may exist twice or more.</p> |
| <pre> for (<i>sequence</i>) <i>process</i> endfor </pre> | <p>Indicates the “for” iteration process.</p> <p>In the order specified in the <i>sequence</i>, execute the <i>process</i> repeatedly.</p> |
| <pre> while (<i>condition</i>) <i>process</i> endwhile </pre> | <p>Indicates the “while” iteration process.</p> <p>While the <i>condition</i> is true, execute the <i>process</i> repeatedly.</p> |
| <pre> do <i>process</i> while (<i>condition</i>) </pre> | <p>Indicates the “do - while” iteration process.</p> <p>Execute the <i>process</i> once, and then while the <i>condition</i> is true, execute the <i>process</i> repeatedly.</p> |

Pseudo programming language notations
(continued)

[Operators and their precedence]

| Type of operator | Operators | Precedence | Note |
|------------------|--------------------------|--|--------------------------------|
| Expression | () ⁽¹⁾ | High  Low | (1) accessing member or method |
| Unary operator | +, -, not ⁽²⁾ | | (2) logical negation |
| Binary operator | x, ÷, mod ⁽³⁾ | | (3) remainder |
| | +, - | | |
| | >, <, ≥, ≤, =, ≠ | | |
| | and ⁽⁴⁾ | | (4) logical product |
| | or ⁽⁵⁾ | (5) logical sum | |

[Boolean-type constants]

true, false

[Array reference]

| | 1-dimensional array | 2-dimensional array | | | | | | | | | | | | | | | | | |
|----------------------------|--|--|----|---|---|---|---|---|----|----|----|---|----|----|----|---|----|----|----|
| Array declaration | <i>type</i> []: <i>name</i> ... | <i>type</i> [,]: <i>name</i> ... | | | | | | | | | | | | | | | | | |
| Example | integer []: a1 <div style="display: flex; justify-content: space-around; margin-top: 5px;"> 12345 </div> <table border="1" style="margin: 5px auto; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">1</td> <td style="padding: 2px 5px;">3</td> <td style="padding: 2px 5px;">5</td> <td style="padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">9</td> </tr> </table> | 1 | 3 | 5 | 7 | 9 | integer [,]: a2 <div style="display: flex; justify-content: space-around; margin-top: 5px;"> 123 </div> <table border="1" style="margin: 5px auto; border-collapse: collapse;"> <tr> <td style="padding: 2px 5px;">1</td> <td style="padding: 2px 5px;">11</td> <td style="padding: 2px 5px;">12</td> <td style="padding: 2px 5px;">13</td> </tr> <tr> <td style="padding: 2px 5px;">2</td> <td style="padding: 2px 5px;">14</td> <td style="padding: 2px 5px;">15</td> <td style="padding: 2px 5px;">16</td> </tr> <tr> <td style="padding: 2px 5px;">3</td> <td style="padding: 2px 5px;">17</td> <td style="padding: 2px 5px;">18</td> <td style="padding: 2px 5px;">19</td> </tr> </table> | 1 | 11 | 12 | 13 | 2 | 14 | 15 | 16 | 3 | 17 | 18 | 19 |
| 1 | 3 | 5 | 7 | 9 | | | | | | | | | | | | | | | |
| 1 | 11 | 12 | 13 | | | | | | | | | | | | | | | | |
| 2 | 14 | 15 | 16 | | | | | | | | | | | | | | | | |
| 3 | 17 | 18 | 19 | | | | | | | | | | | | | | | | |
| Data reference | Data 7 is referred to by a1[4] | Data 16 is referred to by a2[2,3] | | | | | | | | | | | | | | | | | |
| Notation of array contents | {1, 3, 5, 7, 9} | {{11, 12, 13}, {14, 15, 16}, {17, 18, 19}} | | | | | | | | | | | | | | | | | |

Notes: The indexes of arrays start at 1, unless otherwise noted.
Areas outside of the arrays must not be referenced in the program.

Spreadsheet Software Functions and Terminology

The following shows the basic functions and terminology of spreadsheet software.

If functions other than those shown here are used, such as worksheet saving, reading, printing, border drawing, and chart creation, these are shown in the question.

1. Worksheets

- (1) A work area in the form of grids comprising rows and columns is called a worksheet. The size of a worksheet is 256 columns and 10,000 rows.
- (2) Respective positions of columns and rows on a worksheet are represented by row and column numbers. For the column numbers, the leftmost number is A, and they are represented as A, B, ..., Z, AA, AB, ..., AZ, BA, BB, ..., BZ, ..., IU, ...IV. For the row numbers, the topmost number is 1, and they are represented as 1, 2, ..., 10000.
- (3) Multiple worksheets can be used. In this case, a unique name is to be given to each worksheet so that they can be distinguished from the other worksheets.

2. Cells and cell ranges

- (1) Each grid that makes up a worksheet is called a cell. Its position is represented by the column and row numbers, and this is called a cell address.
[Example] The cell address of the cell at column A row 1 is represented as A1.
- (2) When a group of all cells in a rectangular area in a worksheet are to be handled together, the group is represented by using the cell addresses of the cells at top left and bottom right in the rectangle and “:” as “top left cell address:bottom right cell address”. This is called a cell range.
[Example] A cell range whose addresses at top left is A1 and bottom right is B3 is represented as “A1:B3”.
- (3) If a cell address or a cell range in another worksheet is to be specified, the address is represented by using the worksheet name and “!” as “worksheet name!cell address” and the range is represented as “worksheet name!cell range”.
[Example] If cells B5 to G10 in worksheet “Sheet1” are to be specified from another worksheet, it is represented as “Sheet1!B5:G10”.

3. Values and expressions

- (1) A cell has a value, and the value can be referenced by the cell address. A cell value is a numerical value, character string, logical value, or null value.
- (2) A character string is enclosed in single quotation marks “ ’ ”.
[Example] The character strings “ A ” and “ BC ” are expressed as 'A' and 'BC', respectively.
- (3) A logical value is represented as true or false.
- (4) A null value is represented as null, and a cell with a null value is called a blank cell. The initial state of a cell is blank.

- (5) An expression can be entered into a cell. The cell has the value of evaluated result of the expression.
- (6) An expression is composed of constants, cell addresses, operators, parentheses, and functions. A constant is represented as a numerical value, character string, logical value, or null value. A cell address in an expression references a value of the cell at that address.
- (7) An expression is an arithmetic expression, literal expression, or logical expression. An expression that obtains a numerical value as its evaluation result is called an arithmetic expression; the one that obtains a character string is called a character expression; and the one that obtains a logical value is called a logical expression.
- (8) When an expression is entered into a cell, it is evaluated immediately. When a cell value which an expression references changes, the expression is immediately and appropriately reevaluated.

4. Operators

- (1) The unary operators are the plus sign “+” and the minus sign“-”.
- (2) The arithmetic operators are add “+”, subtract “-”, multiply “*”, divide “/”, and exponentiation “^”.
- (3) The comparison operators are greater than “>”, less than “<”, equal to or greater than “≥”, equal to or less than “≤”, equal to “=”, and not equal to “≠”.
- (4) For parentheses, “ (” and “) ” are used.
- (5) If an expression contains multiple operations and parentheses, the order of operations follow the precedence in the table below.

| Type of operation | Operator | Precedence |
|-------------------------|------------------|--|
| Parentheses | () | High  Low |
| Exponentiation | ^ | |
| Unary operations | +, - | |
| Multiplication/division | *, / | |
| Addition/subtraction | +, - | |
| Comparison operations | >, <, ≥, ≤, =, ≠ | |

5. Copying of cells

- (1) A value or expression in a cell can be copied into the other cells.
- (2) In case of copying a cell, when an expression including a cell address has been entered into a source cell and the cell is copied to a destination cell so that the difference in addresses between the source and destination cells can be maintained by making the cell address change in the expression, this way of reference is called relative reference. In this case, an expression, in which the differences in column and row numbers between the source and destination cells are added to the cell address in the expression in the source cell, is entered into the destination

cell.

[Example] When expression “A1+5” has been entered into cell A6 and this cell is copied to cell B8 , expression “B3+5” is entered into cell B8.

- (3) In case of copying a cell, when an expression including a cell address has been entered into a source cell and the cell is copied to a destination cell so that either or both of the column and row numbers of the cell address in the expression in the source cell can be maintained, this way of reference is called absolute reference. A “\$” is placed immediately before either or both of the column and row numbers to which absolute reference is applied.

[Example] When expression “\$A\$1+\$A2+A\$5” has been entered into cell B1 and this cell is copied to cell C4, expression “\$A\$1+\$A5+B\$5” is entered into cell C4 .

- (4) In case of copying a cell, when an expression referencing to another worksheet has been entered into a source cell and the cell is copied to a destination cell, the name of referencing worksheet is not changed in the destination cell.

[Example] When expression “Sheet1 !A1” has been entered into cell A6 in worksheet “Sheet2” and the cell is copied to cell B8 in worksheet “Sheet3”, expression “Sheet1 !B3” is entered into cell B8 .

6. Functions

The functions defined in the table below are available for use in an expression.

| Format | Description |
|--|---|
| SUM(cell range ¹⁾) | Returns the sum of the numerical values within the cell range. [Example] SUM(A1 :B5) returns the sum of the numerical values in range A1 to B5. |
| AVERAGE(cell range ¹⁾) | Returns the average of the numerical values within the cell range. |
| STDEV.S (cell range ¹⁾) | Returns the standard deviation calculated with the numerical values within the cell range as the sample. |
| STDEV.P (cell range ¹⁾) | Returns the standard deviation calculated with the numerical values within the cell range as the population. |
| MAX(cell range ¹⁾) | Returns the maximum value of the numerical values within the cell range. |
| MIN(cell range ¹⁾) | Returns the minimum value of the numerical values within the cell range. |
| IF(logical expression, expression 1, expression 2) | Returns the value of expression 1 when the logical expression is true, and returns the value of expression 2 when the expression is false. [Example] IF (B3>A4, 'Tokyo', C4) returns “Tokyo” when the value of cell B3 is greater than that of cell A4; otherwise, returns the value of C4. |
| COUNT(cell range) | Returns the number of cells within the cell range, which are not blank. |

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| COUNTIF (cell range, search condition) | <p>Returns the number of cells within the cell range, which satisfy the specified search condition. The search condition is described as a pair of comparison operator and expression, and the values of each cell within the range are compared against the value of the specified expression using the specified operator.</p> <p>[Example 1] COUNTIF (H5:L9,>A1) returns the number of cells in range H5 to L9, each of which has a value greater than the value of A1.</p> <p>[Example 2] COUNTIF (H5:L9,='A4') returns the number of cells in range H5 to L9, each of which has character string "A4".</p> |
| INT(arithmetic expression) | <p>Returns the largest integer that is equal to or less than the value of the arithmetic expression.</p> <p>[Example 1] INT(3.9) returns 3.</p> <p>[Example 2] INT(-3.9) returns -4.</p> |
| MOD(arithmetic expression 1, arithmetic expression 2) | <p>Takes the value of arithmetic expression 1 as the dividend and that of arithmetic expression 2 as the divisor, and returns the remainder of the division. Functions "MOD" and "INT" satisfies $MOD(x,y)=x-y*INT(x/y)$.</p> <p>[Example 1] MOD(10,3) returns 1.</p> <p>[Example 2] MOD(-10,3) returns 2.</p> |
| SQRT(arithmetic expression) | <p>Returns the non-negative square root of the value of the arithmetic expression. The value of the arithmetic expression must be a non-negative numerical value.</p> |
| AND(Logical expression 1, Logical expression 2, ...) ²⁾ | <p>Returns true when the values of logical expression 1, logical expression 2, ... are all true. Otherwise, returns false.</p> |
| OR(Logical expression 1, Logical expression 2, ...) ²⁾ | <p>Returns true when at least one of the values of logical expression 1, logical expression 2, ... is true. Otherwise, returns false.</p> |
| NOT(Logical expression) | <p>Returns false when the value of the logical expression is true, and returns true when the value is false.</p> |
| ROUNDUP(arithmetic expression, digit position) | <p>By rounding at the specified digit position of the arithmetic expression, function "ROUNDUP" returns the rounded up value, function "ROUND" returns the rounded value, and function "ROUNDDOWN" returns the rounded down value.</p> <p>[Example 1] ROUNDUP(-314.059,2) returns -314.06.</p> <p>[Example 2] ROUNDUP(314.059,-2) returns 400.</p> <p>[Example 3] ROUNDUP(314.059,0) returns 315.</p> |
| ROUND(arithmetic expression, digit position) | |
| ROUNDDOWN(arithmetic expression, digit position) | |
| CONCATENATE(expression1, expression2, ...) ²⁾ | <p>Treats each of the values of expression 1, expression 2, ... as a character string, and returns one character string that is formed by concatenating them in the order of the expressions.</p> <p>[Example] CONCATENATE('Tokyo','Osaka',123,456) returns character string "TokyoOsaka123456".</p> |

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| RANK (arithmetic expression, cell range ¹⁾ , order condition) | Returns the rank by counting the rank of the value of the arithmetic expression in the cell range in ascending order when 0 is specified as the order condition, or in descending order when 1 is specified. Here, if there are same values in the cell range, they are treated as the same rank, and the next item's rank is determined by adding the number of items of the same rank. |
| RAND () | Returns a uniform random number (real number) greater than or equal to 0 and less than 1. |
| INDEX (cell range, row position, column position) | Counts the rows and columns from the top left within the cell range respectively as 1, 2, ..., and returns the value of the cell at the specified row and column positions within the range. [Example] INDEX(A3:H11,2,5) returns the value of cell E4. |
| VLOOKUP (expression, cell range, column position, search condition) | Scans the leftmost column within the cell range from the top downward, and searches for the first row that satisfies the specified search condition. For this row, it counts the columns within the range from the left as 1, 2, ..., and returns the value of the cell at the specified column position. <ul style="list-style-type: none"> • When the search condition is set to 0 : Searches for a value that matches the value of the expression. • When the search condition is set to 1 : Searches for the largest value that is equal to or less than the value of the expression. At this time, the cell values in the leftmost column must be sorted in ascending order from the top. [Example] VLOOKUP(15,A2:E10,5,0) searches in the leftmost column within the cell range, A2, A3, ...A10. In this case, if it first finds 15 at cell A6, it returns the value in cell E6 in the same row as cell A6 within column E, the fifth column from column A at the left end in the range. |
| HLOOKUP (expression, cell range, row position, search condition) | Scans the topmost row within the cell range from left to right, and searches for the first column that satisfies the specified search condition. For this column, counts the rows from the top within the range as 1, 2, ... and returns the value of the cell at the specified row position. <ul style="list-style-type: none"> • When the search condition is set to 0 : Searches for a value that matches the value of the expression. • When the search condition is set to 1 : Searches for the largest value that is equal to or less than the value of the expression. At this time, the cell values in the topmost row must be sorted in ascending order from the left. [Example] HLOOKUP(15,A2:G6,5,1) searches in the topmost row within the cell range, A2, B2, ...G2. In this case, if it first finds the largest value equal to 15 or less at cell D2, it returns the value of cell D6 in the same column as cell D2 within row 6, the fifth row from row 2 at the top in the range. |

Note¹⁾ Within the cell range that is passed as the argument, values other than numerical values are out of scope for processing.

²⁾ The number of expressions that can be passed as arguments is 1 or more.