April 2010

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 - 12:15 (165 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 following sample question.

   [Sample Question]
   Q1. In which month is the spring IT Passport Examination conducted?

   a) March b) April c) May d) June

   Since the correct answer is “b)” (April), mark your answer sheet as follows:

   [Sample Answer]

Q1	Ⓐ	●	Ⓒ	Ⓓ

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

Q1. Which of the following is an explanation of management principles?

a) Fundamental concepts that present the company's significance of existence and values, and act as the guideline for business activities
b) Resources, usually categorized as people, money, materials, or information, which are utilized by a company to gain a competitive advantage
c) Long-term, mid-term, and short-term decision making plans for realizing the vision that indicates the future direction of the company
d) Unique style or characteristics of a company, also referred to as corporate culture, which has been derived and established over many years of business activities

Q2. Among management organizations, which of the following is an explanation of divisional organization?

a) A corporate organization is divided into smaller groups, and each group takes partial charge of functions interactively to complete the organization as a whole.
b) A corporate organization is divided into groups based on business functions, such as product planning, purchasing, manufacturing, and sales.
c) A corporate organization is divided into profit-responsible units according to product or market categories, with delegated authority and business goals.
d) Employees belong to two different organizational structures to flexibly handle business operations on an as-required basis.

Q3. For system failures of the past five years, which of the following is the most appropriate chart to compare the annual trend of the number of failures by type and the total number of failures?

a) Line-area chart	b) Double pie chart
c) Portfolio chart	d) Radar chart

Q4. There are a total of 30 PCs across six departments. Software to be used on all of these PCs is to be purchased. When the purchasing methods shown in the table below are available, how much does the cheapest purchase arrangement cost in dollars? Here, each department needs at least one manual.

Purchasing method	Right of use	Manual	Price (dollar)
Single package	1	1	150
1 license	1	0	120
5 licenses	5	0	450

a) 2,700 b) 3,060 c) 3,150 d) 3,180

Q5. Which of the following is a case where the use of a Pareto chart is effective?

a) Evaluating the quality of a large number of modules by plotting the number of bugs per unit step
b) Understanding the progress of a test by plotting both the occurrence of bugs and the cumulative total of bugs in chronological order
c) Predicting the number of remaining bugs by plotting the cumulative total of bugs in chronological order
d) Stratifying the bugs by cause and sorting them in descending order to identify significant problems that result in greater improvement when solved

Q6. How much (in millions of dollars) is the cost of sales in the current period under the conditions shown below?

[Conditions]
Product inventory at the beginning of the current period: 2 million dollars
Amount of products purchased in the current period: 10 million dollars
Product inventory at the end of the current period: 3 million dollars

a) 5 b) 7 c) 9 d) 11

Q7. The amount brought forward and purchases and sales in the current period are shown in the table below. When inventory assets are evaluated using first-in first-out method at the end of the period on December 31, how much (in dollars) is the base stock?

Purchases

Date	Quantity	Unit price (dollar)
Amount brought forward	10	100
May 1	15	90
October 15	5	70

Sales

Date	Quantity
March 20	4
August 31	8
November 20	6

a) 840　　b) 980　　c) 1,080　　d) 1,180

Q8. Which of the following is an explanation of an income statement?

a) It shows the fluctuation of the funds during a single accounting period as activities in three areas: sales, investment, and financial affairs.
b) It lists every income and cost during a single accounting period, and shows the calculated profit.
c) It shows the income and expenditure in cash and deposit during a single accounting period.
d) It lists all assets, liabilities, and capital stocks at the end of an accounting period.

Q9. Which of the following is the most appropriate description concerning the use of a single-licensed software package purchased for one PC or a computer at a company?

a) Since the program purchased for a PC is owned by the company, it can be freely copied to other PCs in the company.
b) The purchased program can be installed on a LAN server and downloaded into multiple PCs connected to the server.
c) When the purchased program is upgraded to a new version, the unnecessary old version can be used for personal purposes outside the company.
d) When a computer manufactured by Company *A* is replaced with another manufactured by Company *B*, the program can be altered without the permission of the copyright holder within the extent necessary for the replacement.

Q10. In electronic commerce using public key cryptography, which of the following is created by the CA (Certification Authority) which is a third-party organization independent from the parties involved in the transaction?

a) Electronic certificate for public keys of the parties involved in the transaction
b) Digital signature of the parties involved in the transaction
c) Passwords for the parties involved in the transaction
d) Electronic certificate for private keys of the parties involved in the transaction

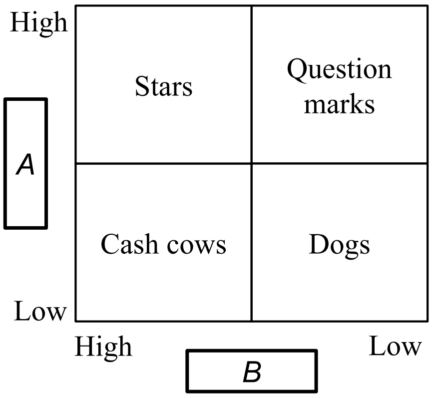
Q11. An e-mail with a subject of "Caution: New computer virus" was received from the external network. The sender is not a recognized person, and the truth of the content is unknown. However, the e-mail describes the characteristics of the virus, and instructs that the e-mail must be forwarded to as many people as possible. Which of the following is an appropriate response with regard to this e-mail?

a) The e-mail is forwarded to acquaintances.
b) The e-mail is forwarded to all employees.
c) The e-mail is not forwarded to anyone.
d) An e-mail is sent to the sender to ask for countermeasures against the virus.

Q12. Which of the following is the characteristic of QR code?

a) Reading direction is identified by using position detection patterns (cut-out symbols).
b) It requires more space than a one-dimensional bar code to represent the same amount of data.
c) It can only encode numbers and alphabetical letters.
d) It is a stacked bar code, which is made up of a set of bar codes stacked vertically one above another.

Q13. A PPM (Product Portfolio Management) matrix is shown below. Which of the following is the appropriate combination of phrases to be inserted into blanks *A* and *B*?



	A	*B*
a)	Gross profit margin	Market growth rate
b)	Gross profit margin	Relative market share
c)	Market growth rate	Gross profit margin
d)	Market growth rate	Relative market share

Q14. Which of the following is the appropriate combination of the external environment factors in a SWOT analysis used for business strategy planning?

a) Opportunities and threats
b) Resources and technology
c) Market and customers
d) Strengths and weaknesses

Q15. Which of the following is an explanation of core competence management?

a) Knowledge scattered across the company is shared to enhance the overall problem-solving capability.
b) A flat organization structure with minimal hierarchical layers is maintained to accelerate decision making.
c) Comparative analysis with other successful companies is performed to drive management innovation.
d) Proprietary know-how and technology, which are not easy for other companies to imitate, are focused to manage the company.

Q16. Which of the following explains the maturity stage of product life cycle?

a) In this stage, sales increase rapidly. The market is revitalized and new players enter the market, leading to more intense competition.
b) In this stage, sales and profits decrease gradually. Refraining from making additional investments and withdrawing from the market is considered.
c) In this stage, growth in demand starts slowing down. Maintaining market share and ensuring profit take precedence by means such as improving product quality.
d) In this stage, the company provides products to forward-thinking consumers. A strategy to increase product recognition is adopted.

Q17. Company *X* summarized the results of positioning analysis of its marketing power in relation to competitors into the table as shown below. In the table, "1" is the lowest score, and "5" is the highest score. Where does Company *X* rank from the top?

	Weight	Company *X*	Company *A*	Company *B*	Company *C*
Price	5	3	4	3	2
Product quality	3	3	3	2	5
Brand name	3	4	2	5	1
Selling power	4	2	4	4	5

a) 1 b) 2 c) 3 d) 4

Q18. Which of the following is a management technique used to maintain a close relationship with customers and increase profit by collecting various kinds of information from customers and markets and promptly utilizing such information for various purposes?

a) CRM b) ERP c) MRP d) SCM

Q19. As groupware applications that use servers on the corporate network connected via WAN, two systems are developed; one is a product catalog system, which requires regular updates of large volumes of data including graphic information, and the other is a conference room reservation system, which requires real-time data update. The groupware applications have a replication function to automatically synchronize databases between servers, and allow updated data from a source database to be reflected on a destination database at a specified time. From viewpoints of the data volume and application operations, which of the following is an appropriate deployment of the databases?

a) The product catalog system is deployed on a single server, and the conference room reservation system is deployed on multiple servers using the replication function.
b) The product catalog system is deployed on a single server, and the conference room reservation system is deployed on another single server.
c) The product catalog system is deployed on multiple servers using the replication function, and the conference room reservation system is deployed on a single server.
d) The product catalog system is deployed on multiple servers using the replication function, and the conference room reservation system is also deployed on multiple servers using the replication function.

Q20. Which of the following is an application that is suitable for groupware?

a) Score calculation of semester final exams
b) Month-end sales calculation
c) Air traffic control
d) In-house electronic bulletin board

Q21. Which of the following is the situation where an improvement can be expected by installing an MRP (Material Requirements Planning) system?

a) Drawing information is managed on both electronic files and hard copies, so design change history cannot be accurately known.
b) Information concerning materials necessary for manufacturing and their required quantities is complicated, so it is easy to miscalculate order quantities, and production is being adversely affected.
c) There are many design changes, so production efficiency does not improve.
d) High-mix, low-volume production is adopted, so the cost of installing production equipment is increasing.

Q22. When 300 pieces of Product A in the component table below are shipped, which of the following is the net requirement of Part b? Here, the quantity in stock for A, a, b, and c are as shown in the stock table below. In addition, there are no other items in process, on back order, or already allocated.

Component table

Item	Component (pcs)		
	a	b	c
A	3	2	
a		1	2

Stock table

Item	Quantity in stock (pcs)
A	100
a	100
b	300
c	400

a) 200 b) 600 c) 900 d) 1,500

Q23. Which of the following is an explanation of EDI?

a) It is an international standard for e-mail services, based on the OSI basic reference model, which provides comprehensive services for the generation, transmission, and processing of messages. These services enable the interconnection between heterogeneous systems.
b) It is the exchange of business transaction data between computers (including terminals) over a communication line. A standard convention is used to describe various rules that must be followed by the parties involved.
c) It is a communication service that provides added values such as storage of data transmitted over the network and conversion of data formats.
d) It is an ordering system that allows orders to be placed by transmitting order information from a data entry terminal to the head office or a supplier. This system saves labor in processing orders, and improves the efficiency of logistics and inventory control.

Q24. Which of the following can be used to check the validity and credit limit on an online basis before credit card payments are accepted?

a) ACR　　b) CAT　　c) GPS　　d) PDA

Q25. When a corporate information strategy is developed, which of the following is the most important item to be considered?

a) Evolution of information technology
b) Consistency with the business strategy
c) Consistency with existing systems
d) Information strategy of competitors

Q26. Which of the following is an explanation of a business process model?

a) It describes data and functions required for programming during system development.
b) It specifies conditions necessary for asking for proposal regarding the outsourcing of system development.
c) It specifies the business activities and data flow which are subject to computerization.
d) It describes organizations and resources required for the development, operations, and maintenance of a system.

Q27. Which of the following is appropriate as an advantage of outsourcing system operations?

a) The company can decide to resume its own system operations as before at any time.
b) The company can have its information systems department focus on business tasks such as planning and development.
c) It becomes easier to recognize problems in information systems.
d) It becomes easier for the company to take measures against troubles on its own.

Q28. Among outsourcing services, which of the following is provided by an MSP (Managed Service Provider)?

a) Connectivity to the Internet using “co-location” servers
b) Business processes such as human resource management, accounting, sales, and logistics
c) The operations management of an IT infrastructure such as a network, server, or storage over a network
d) Standard application services over a network through a billing method such as a flat fee

Q29. Which of the following is an explanation of SaaS?

a) Computer facilities are provided as a service, and a usage fee is charged.
b) Part of the functions of the information systems department are undertaken under the outsourcing agreement, and a service fee is charged.
c) Software functions are provided as a service to multiple companies via the Internet, and a usage fee is charged.
d) Software is provided for download, and a license fee is charged.

Q30. Which of the following is an appropriate description concerning risk analysis?

a) Since coping with all possible risks requires too much time and cost, the amount of each risk loss and its probability should be predicted, and priority should be assigned depending on the severity of the risk.
b) Before all measures are completed for a risk estimated by risk analysis, the risk analysis should not be repeated.
c) Since the purpose of risk analysis is to prevent future loss, the data stored in similar projects in the past should not be referenced.
d) Since the purpose of risk analysis is to know the actual amount of a loss suffered from the occurrence of a risk, the cost of the measure should be determined according to the amount of the loss.

Q31. Which of the following is appropriate as the source and destination of RFP (Request For Proposal) for system development?

	Source (From)	Destination (To)
a)	Information systems department	CIO
b)	Information systems department	Vendor
c)	Information systems department	User department
d)	Vendor	CIO

Q32. Before putting the system into full operation, the user department and the information systems department decided to jointly conduct operational tests to check if the system works correctly. To which of the following should the user department give priority?

a) Checking if processes, such as online processing or batch processing, work according to operational procedures
b) Checking if the system works according to predetermined business procedures
c) Checking if all application programs work according to specifications
d) Checking if the desired performance is achieved

Q33. Which of the following is an appropriate explanation of external design and internal design?

a) Systems are divided into several programs in external design, while DFDs are created for each program in internal design.
b) Data items are identified and logical data structures are determined in external design, while physical data structures, data processing method, and checking method are determined in internal design.
c) The order in which external design and internal design are performed is determined based on user requirements in the basic planning phase.
d) External design is system design from the computer's perspective, while internal design is system design from the user's perspective.

Q34. Which of the following is an appropriate description concerning program maintenance?

a) The source programs for the past few generations are checked, and then one version on which changes can be made most efficiently is selected and modified.
b) If the program is simple, the logic is self-explanatory from the source code, so a change history does not need to be maintained.
c) The maintenance work is completed when the requester who asks for the changes confirms the content based on an acceptance test under the test environment.
d) Programs in the production library should not be modified directly, but should rather be copied to the test library in order to make changes to them.

Q35. When the default values (or predefined values) for options displayed on a data entry screen are determined, which of the following is an appropriate approach?

a) The default values are determined according to business requirements, so they should not be changed.
b) The values specified by the very last user can always work as the default values with great efficiency.
c) The default values should be displayed in the upper left of data entry screens from an efficiency viewpoint.
d) Frequently used values, if any, should be used as the default values.

Q36. Which of the following is the method that is used to test the functions of modules in accordance with specifications without respect to their internal structures?

a) Top-down test
b) Black box test
c) Bottom-up test
d) White box test

Q37. Which of the following is an appropriate description concerning program test?

a) It is better to assure software quality during the test phase than to improve it during the design phase.
b) When a program is modified after completion of the test, it is better to retest the program by using test data for checking the modified part in addition to data confirmed in the previous test.
c) It is better to exclude test data which triggers errors in the program, because the purpose of the test is to confirm that the program works properly.
d) It is better for programmers to design and execute the test cases.

Q38. When a system is developed using a waterfall model, which of the following is the most appropriate method that can be expected to shorten the development period?

a) Together with the start of the external design phase, the internal design and programming phases are performed in parallel.
b) Documents, such as internal design specifications, are created after the start of full operation of the system.
c) The number of project staff is increased in order to enable parallel activities in each phase such as internal design, programming, and unit test.
d) The results of requirements definition, external design, and internal design are reviewed all together at the completion of the internal design phase.

Q39. Which of the following is an appropriate description concerning software development productivity?

a) If defects are detected at an early stage of the development cycle, they can be corrected with fewer person-hours, and thereby productivity is increased.
b) Effective communication between the development team and the user department has nothing to do with productivity.
c) Productivity is the same regardless of whether to use high-level languages or assembly languages.
d) The adoption of an appropriate estimation method improves productivity.

Q40. Among the descriptions about charts used for process management, which of the following is a characteristic of the Gantt chart?

a) It is suited for grasping the important points in process management, and is used for personal progress management.
b) It allows the order relation, required number of days, and number of floating days to be grasped for individual activities.
c) It allows the scheduled and actual start/finish of each activity, as well as the activities in progress, to be grasped.
d) It is suited for representing the chronological transition of the amount of activities performed, and allows cost and progress to be managed simultaneously.

Q41. Which of the following explains how to use a control chart?

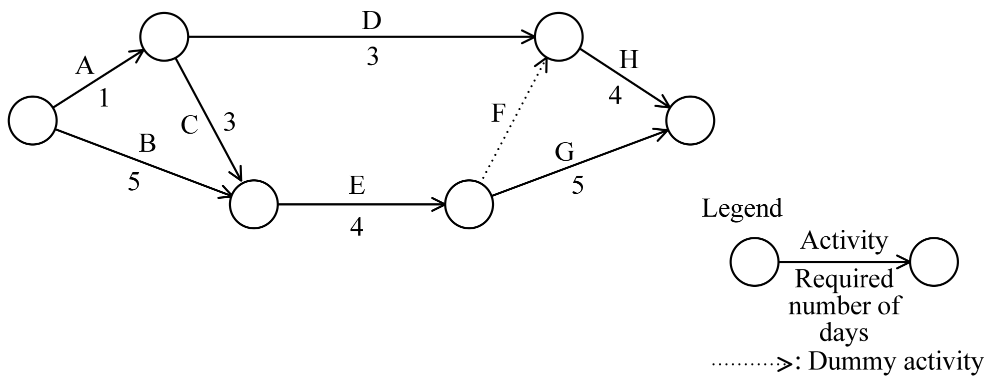
a) A network diagram is created with arrows connecting the individual activities and indicating their chronological relationships. The control chart is useful for identifying process bottlenecks and preparing schedules.

b) A center line and a pair of upper and lower boundary lines are drawn, and the characteristic values of products, etc. are plotted. The control chart is useful for detecting quality problems and process abnormalities, so that the causes of problems can be eliminated and problem recurrences prevented.

c) The numbers of product defect instances and the amounts of loss are categorized according to defect cause, then sorted in descending order and added to the cumulative total. This makes it possible to identify items whose improvement has a greater impact.

d) Elements considered to be possible causes of a problem are arranged in a shape that looks like a fishbone. This makes it possible to identify the essential causes of the problem, and is useful in solving it.

Q42. In the arrow diagram below created to manage the schedule of a project, which of the following is the critical path?



a) A → C → E → G

b) A → D → H

c) B → E → F → H

d) B → E → G

Q43. The table below shows the current status of the development of design specifications, indicating the number of actual person-days worked and the degree of progress. If current productivity is maintained, how many person-days are required to complete all specifications?

	Actual person-days worked	Current progress (%)
External design spec	500	100
Internal design spec	350	70
Program design spec	270	30

a) 150　　b) 630　　c) 780　　d) 1,120

Q44. Which of the following is the first task to be performed when a project is initiated?

a) Progress management
b) Scheduling
c) Clarification of the project goals
d) Budget planning

Q45. When a software development project is outsourced under a service contract, which of the following is a responsibility of the outsourcer?

a) Directing the outsourcee to start the development prior to the contract date
b) Requesting a list of development staff
c) Making arrangements for the workplace and computer equipment used for the development
d) Providing a list of deliverables and their delivery schedule

Q46. Which of the following is the purpose of an SLA, an agreement between the IT service provider and the customer on the service level provided?

a) To clearly define the scope and quality of the service
b) To clearly define the procedure for monitoring the service management periodically
c) To clearly define the objectives of computerization
d) To clearly define the education necessary for the staff

Q47. From the perspective of system operations and management, which of the following is **not** an appropriate reason for making a judgment on the end of the system life cycle?

a) More users are becoming unhappy because they are often unable to use newer versions of programs.
b) Programs are becoming more complicated because of repeatedly added or modified functions, and a heavy burden is imposed on the maintenance work.
c) Failures occur more frequently, maintenance parts take longer to obtain, and repairs take longer than before.
d) Incidents, such as unauthorized access, program and/or data destruction, and password theft, are becoming more frequent.

Q48. Which of the following is performed in the PLAN phase of a PDCA (Plan-Do-Check-Act) model applied to an ISMS (Information Security Management System) process?

a) Management of operational status
b) Implementation of improvement measures
c) Review of implementation status
d) Risk assessment on information assets

Q49. Which of the following is an appropriate description concerning the purpose of incident management performed as a part of system operations management?

a) To identify the components of IT assets to prevent exceptional use
b) To recover the service with minimum disruption to maintain the service quality
c) To ensure changes in the implementation of an IT service comprised of both software and hardware
d) To provide a single point of contact for all user inquiries to ensure service delivery

Q50. Which of the following is an appropriate description concerning a risk management system?

a) Authority and functions is concentrated at the risk management executive who performs all risk management tasks from detection/identification to evaluation of risks.
b) Since risk management includes security control, departments other than those specific to risk management should not be involved in risk management.
c) Since risk handling relates to insurance and business resource management, the financial department should play the role of the risk management department.
d) Measures against risks should be performed by each department possessing authority and functions, and total management should be performed by the risk management department directly connected with the top management team.

Q51. In a certain company, multiple PCs are to be used on a 100-volt commercial power supply available in the facility. The PCs and display monitors are connected to a dedicated power distribution board, and the maximum capacity of the circuit breaker is 20 A (amperes). What is the maximum number of PCs that can operate simultaneously? Here, the power consumption is 200 W (watts) per PC and 100 W per display monitor. PCs and display monitors are always used as a pair. Moreover, the power consumption stays flat.

a) 4 b) 6 c) 10 d) 12

Q52. Which of the following is specified as a requirement concerning internal audits in ISO 9001?

a) Internal audits are conducted by the company's system audit department or system audit specialists.
b) Internal audits are conducted at irregular intervals without prior notice to determine whether the quality management system is functioning correctly as specified.
c) Internal audits are conducted to determine whether the quality management system is effectively implemented and maintained, and conforms to the planning of product realization and to the requirements of the standard.
d) As a prerequisite for conducting internal audits, the quality management system must be certified according to ISO 9001.

Q53. Which of the following is an explanation of IT governance?

a) A framework which is a comprehensive collection of best practices (successful cases) concerning the management and operation rules of IT services
b) The organizational ability to guide the development and implementation of an IT strategy in the correct direction to establish a competitive advantage
c) A specifications package requesting a detailed system proposal from a subcontracting IT vendor from which information systems and IT services are to be procured
d) An agreement in which the service level is clearly defined by a service provider in order to assure the quality of the service

Q54. Which of the following is obtained by multiplying the binary value 10110 by three?

a) 111010　　b) 111110　　c) 1000010　　d) 10110000

Q55. In order to compare the questions in the employment exams for last year and this year, a large number of employees were asked to take both tests. The correlation coefficient and the regression line were then obtained by plotting the scores for the last year's exam against the *x*-axis and the scores for this year's exam against the *y*-axis. Which of the following facts can be determined from the results shown below?

[Results]
The correlation coefficient is 0.8.
The regression line has a slope of 1.1.
The *y*-intercept value of the regression line is 10.

a) The *y*-intercept value of the regression line indicates that an employee who scored zero (0) point on this year's exam can score around 10 points on last year's exam.
b) The slope of the regression line indicates that the average score for this year's exam is 1.1 times the average score for the last year's exam.
c) The slope and the *y*-intercept value of the regression line indicate that higher scores are easier to obtain with this year's exam in comparison to last year's exam.
d) The slope of the regression line and the correlation coefficient indicate that this year's exam is superior in quality compared to the last year's exam.

Q56. A search is performed by specifying a character string comprised of multiple alphabetic characters and one delimiter character "." (period). An "∗" (asterisk) represents an arbitrary character string with zero or more characters, and a "?" (question mark) represents an arbitrary single character. Which of the following character strings matches the character string represented below?

X∗.Y??

a) XY.XYY b) XXX.YY c) XYX.YXY d) YXYX.YXY

Q57. Which of the following is a characteristic of tree structure that is one of data structures?

a) Data elements can be retrieved by traversing a hierarchy of nodes from the higher levels to the lower levels.
b) Data elements can be retrieved in the order in which they were stored.
c) Data elements can be retrieved in the reverse order from the order in which they were stored.
d) Data elements can be retrieved by traversing cells consisting of a data field and a pointer field.

Q58. At a desk that is only large enough to place 4 files at the same time, 6 files, *A* through *F*, are used to perform a task. When 4 files are already placed on the desk, the least recently used file must be placed back into the drawer before the 5th file can be 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*

Q59. Which of the following is an appropriate explanation of Java?

a) It is an interpreter-type object-oriented language developed in the 1970s and includes an integrated development environment with editor and debugger as well as OS functions.
b) It incorporates object-oriented concepts, such as class and inheritance, into the programming language C, and has upper compatibility with C.
c) It is a markup language used on the Web and describes the document structure by using tags. It enables the creation of hypertext that links text, movies, etc.
d) It is an object-oriented language and enables the creation of applets that run in Web browsers.

Q60. Which of the following is an appropriate description of a characteristic of hypertext written in HTML?

a) Text information is handled, so image files cannot be linked.
b) Links are hierarchically structured, so the user must return to the top hierarchical level to move to another text.
c) Links have bidirectional information, so the user can move freely between texts.
d) The user can move to the specified text by clicking a link.

Q61. Which of the following is an appropriate description concerning the cooling system in a PC?

a) Cooling efficiency is enhanced by installing air outlet and inlet fans next to each other on the back of the enclosure.
b) Disk surface in a hard disk drive is cooled by circulating external air flow into the drive.
c) A heat sink with a higher volume-to-surface area ratio provides higher cooling efficiency.
d) A fanless PC uses cooling methods such as natural convection cooling and water cooling.

Q62. Which of the following is an appropriate characteristic of flash memory?

a) Since it allows high-speed access, it is used as cache memory, etc.
b) Since data can be written only once, it is used as program memory, etc.
c) Since it is rewritable and nonvolatile memory, it is used as USB memory or SD card.
d) Although refresh cycles are required, it is used as main memory because of the capability of rewriting data any number of times.

Q63. Which of the following is an appropriate explanation of primary cache memory and secondary cache memory (hereinafter referred to as “primary” and “secondary” respectively) in a CPU?

a) Primary and secondary are categorized based on access speed; high-speed memory is referred to as primary, and low-speed memory is referred to as secondary.
b) Primary is memory to speed up the data transfer between the hard disk and CPU, while secondary is memory to speed up rendering on a video graphics board.
c) Primary is memory to speed up memory access, while secondary is memory to increase virtual capacity of main memory.
d) Primary is memory which the CPU accesses first, while secondary is memory accessed next by the CPU when required information is not found in primary.

Q64. Which of the following is a characteristic common to IEEE 1394 and USB that are connection interfaces for computers and peripheral devices?

a) Peripheral devices can be connected and disconnected while the computer and/or devices are powered on.
b) A maximum transfer rate is 100 Mbits/second.
c) A unique ID needs to be assigned to each device connected to a PC.
d) Data can be transmitted in parallel over multiple data lines.

Q65. Which of the following is an appropriate description concerning a hot site in a backup system configuration?

a) It is a shared site where, at the occurrence of a failure, backup data and programs are transported to recover the system and resume operations.
b) It runs as a standby site where data and programs are constantly updated via network, and operations are immediately resumed at the occurrence of a failure.
c) It is a backup site where hardware is installed, and data and programs are transported and stored on a regular basis. At the occurrence of a failure, these are used to recover the system and resume operations.
d) It is a reserved backup site where, at the occurrence of a failure, necessary hardware, data, and programs are transported and operations are resumed.

Q66. There is a system consisting of two processing units. What is the difference in availabilities between when one of the units must be running for the system to function and when both units must be running? Here, the availability for each processing unit is 0.90, and factors other than the processing unit are ignored.

a) 0.09 b) 0.10 c) 0.18 d) 0.19

Q67. Which of the following is the term used to describe the volume of work processed by a system during a specific time period?

a) Access time b) Overhead
c) Throughput d) Turn around time

Q68. What is the minimum virtual memory required (in Mbytes) under the conditions below?

[Conditions]

1. Memory required for the OS: 200 Mbytes
2. Memory required for applications: 50 Mbytes per application, multiplied by the number of applications that run concurrently. Eight applications run concurrently.
3. Memory required for activities such as controlling main memory: Amount of main memory + 20 Mbytes. Amount of main memory is 512 Mbytes.
4. Required virtual memory: Sum of the conditions 1 through 3.

a) 762 b) 782 c) 1,112 d) 1,132

Q69. Which of the following explains the functions of an archiver that is one type of data management utility?

a) It prepares areas on hard disks for storing data and managing such stored data.
b) It packs multiple files into a single file or restores them for data backup or distribution.
c) It protects data through such functions as file protection to secure the data from unauthorized use or destruction, and copy protection to prevent illegal data copying.
d) On a fragmented hard disk, it reorganizes files by placing them in as many consecutive blocks as possible.

Q70. In a system, four types of access rights (*Read*, *Append*, *Modify*, and *Delete*) are set on each record of the file used there. For example, one file might be set to *Read* only, while another file might be set to three access rights, *Read*, *Append*, and *Modify* at the same time.
What is the maximum number of combinations of these access rights that can be set on a file? Here, at least one access right must be set. When *Modify* is set, *Read* and *Append* are also set automatically. When *Delete* is set, all of the other three rights are also set automatically.

a) 4 b) 5 c) 8 d) 15

Q71. Which of the following is an appropriate usage of charts, graphs, or diagrams?

a) A line graph is used to represent the ratio of operating profit by business segment.
b) A pie chart is used to compare the profitability, stability, and productivity of several companies.
c) A radar chart is used to represent the change in sales over the past three years.
d) A scatter diagram is used to represent the correlation between the number of passengers getting on and off at the nearest station and the number of customers visiting a chain store.

Q72. A spreadsheet program is used to create a quick reference chart for the compound interest per a principal of 1,000 dollars. Which of the following is the expression that should be entered in cell B4? Here, the expression in cell B4 is copied to each of cells B4 through F13.

	A	B	C	D	E	F
1	Principal	1,000				
2	Interest rate	0.02	0.025	0.03	0.035	0.04
3	Number of years					
4	1					
5	2					
6	3					
⋮	⋮	⋮	⋮	⋮	⋮	⋮
13	10					

a) B1*((1+$B2)^$A4−1)
b) B1*((1+$B2)^A$4−1)
c) B1*((1+B$2)^$A4−1)
d) B1*((1+B$2)^A$4−1)

Q73. Which of the following is an appropriate description concerning “open source”?

a) Modification of the source code is permitted under certain conditions.
b) Redistribution is permitted for limited usage and users.
c) The copyright for the source code is disclaimed.
d) The source code must be distributed for free.

Q74. When a GUI screen is designed for users who are both familiar with keyboard operation and users who are not, which of the following is the most appropriate consideration to realize a user interface with good usability?

a) Minimizing the number of items for keyboard entry, and having users select as many items as possible from lists using a mouse
b) Providing both mouse and keyboard interfaces for frequently used operations
c) Enabling frequently used operations to be executed by double-clicking the mouse
d) Grouping together important items, such as mandatory items, irrespective of the format of the data entry sheet, in order not to cause a lack of input

Q75. A company has different kinds of forms that must be submitted by paper. The company wishes to provide these forms as electronic files on the Web bulletin board system within its intranet, and make them available to all employees. Since many of the forms use more than one font, and/or include diagrams and tables, the forms must be printable without being affected by the user's software environment. Which of the following is the most appropriate data format?

a) HTML format
b) PDF format
c) Text data format
d) Data format for a word-processing software

Q76. Which of the following is an international standard for a compression method for still (or static) images?

a) BMP   b) JPEG   c) MPEG   d) PCM

Q77. Which of the following is used for supporting decision making by organizing, integrating, and accumulating a large volume of data obtained through various corporate activities?

a) Data administration   b) Data warehouse
c) Data dictionary   d) Data mapping

Q78. A hard disk failure occurred on a mail server, and e-mails of many users were lost. Recovery of data was attempted, but e-mails sent and received during the two-week period after the last backup could not be restored because backups were only created every two weeks. Taking a lesson from this incident, a measure is to be implemented to allow restoration up to the state of the day before such a failure. Which of the following is an appropriate measure?

a) Performing daily incremental backup in addition to biweekly (every two-week) full backup
b) Accumulating e-mails on multiple different hard disks in a distributed manner
c) Implementing hard disk mirroring on the mail server for higher reliability, without changing the existing backup schedule
d) Storing daily backup onto the same hard disk media, and a biweekly (every two-week) copy of the backup to another storage media

Q79. Which of the following is the role of DNS in a TCP/IP network?

a) It allocates an unused IP address from the addresses registered in a server in response to an IP address allocation request from devices such as PCs.
b) It allows server programs to be called by specifying only the program name, regardless of the server IP address.
c) It translates an in-house private IP address to a global IP address to enable access to the Internet.
d) It maps a domain name or a host name to an IP address.

Q80. Which of the following can be implemented by using the packet filtering of a firewall?

a) Tampered packets received from the Internet are corrected. If a packet cannot be corrected, a log is generated and it is blocked from passing into the internal network.
b) The header and data of the packet received from the Internet are checked for tampering. If any tampering is detected, the packet is discarded.
c) A packet with a dynamically allocated TCP port number is permitted to pass through to the internal network by converting the packet to one with a fixed TCP port number on the receiver side.
d) Only packets with a specific TCP port number are permitted to pass through to the internal network from the Internet.

Q81. Which of the following is an appropriate measure to avoid a shortage of total mailbox capacity at the mail server?

a) Setting an upper limit for each user's mailbox capacity
b) Implementing mirrored disks on the mail server
c) Having back-ups of mail data
d) Sending large e-mails in bulk during hours when they do not adversely affect the transmission of other e-mails

Q82. Which of the following is an appropriate description concerning protocols and languages related to the Internet?

a) FTP is a protocol for transferring e-mail messages with files attached to them.
b) HTML is a language that allows the user to define tags for describing the logical structure of a document.
c) HTTP is a protocol for transferring information such as HTML documents.
d) SMTP is a protocol for sending and receiving image information.

Q83. Public key cryptography is used for message encryption to prevent wiretapping. Which of the following is the key used to encrypt the message to be sent?

a) Receiver's public key
b) Receiver's private key
c) Sender's public key
d) Sender's private key

Q84. Which of the following is the purpose of attaching a digital signature to software published on the Internet?

a) To notify that the software author is responsible for its maintenance
b) To restrict the software usage to certain users
c) To express that the software copyright holder is the signer of the digital signature
d) To assure that the software content has not been changed or tampered with

Q85. Which of the following is an effective measure against information leakage?

a) A checksum should be appended to the data to be sent.
b) Hard disks in which data is stored should be mirrored.
c) Copies of data backup media should be stored at a remote site.
d) Content of hard disks in notebook PCs should be encrypted.

Q86. Which of the following is the most appropriate description concerning worms?

a) They infect the OS system files and repetitively intrude other computers over the network.
b) Unauthorized functions, such as file destruction, are activated when a certain specific date or condition is met.
c) They copy and multiply themselves, and move from one computer to the next through a network.
d) They infect other programs and propagate themselves independently without using a network.

Q87. A Web server was invaded from the outside and tampered with its content. Which of the following is the appropriate sequence of actions to be taken?

1	Analyze the server, IDS (Intrusion Detection System), and firewall logs to identify the access method, the extent of the impact, and the route of entry.
2	Rebuild the system, and apply the latest patches and security setup data.
3	Disconnect the server from the network.
4	Connect the server to the network, and monitor its operation for a while.

a) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
b) $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$
c) $2 \rightarrow 3 \rightarrow 1 \rightarrow 4$
d) $3 \rightarrow 1 \rightarrow 2 \rightarrow 4$

Q88. Which of the following can be realized by using SSL/TLS?

a) Communication processing time between the client and server is reduced.
b) Communication between the client and server is encrypted.
c) Communication logs between the Web server and browser are recorded.
d) SMTP connection from e-mail software to a Web server is enabled.

Answer Questions A through C, each of which has four questions.

Question A

Read the following description concerning the procedure for identifying a system failure in a LAN-based system, and then answer **Q89** through **Q92**.

Mr. *M*'s department uses a LAN-based system which consists of two PCs (PC1 and PC2), one server, one printer, and one hub, connected with four cables *a* through *d* as shown in the figure below.

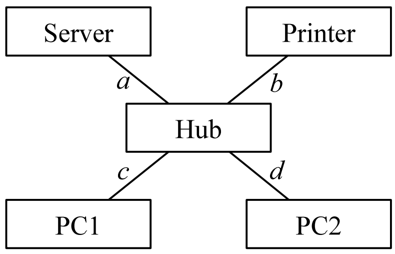


Fig. LAN configuration

The printer connected to the LAN has a print server function, which is configured to allow PCs to print from them directly. One day, Mr. *M* tried to print from PC1 but could not. On the previous day, Mr. *M* could print from PC1 without any problem.

Here, in inspecting the connection between a device and a cable, a defective socket is identified as a device failure, and a defective connector is identified as a cable failure. There can only be one failure in the system at any given time, and there is no failure in PC1.

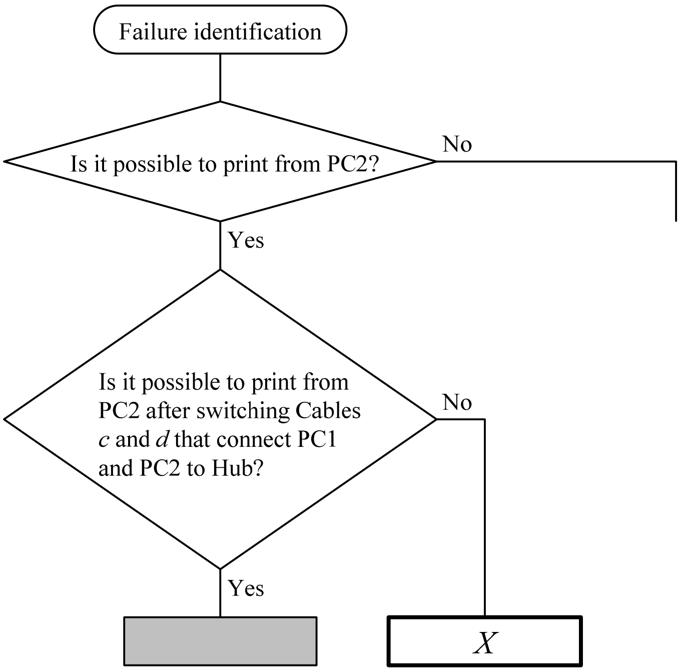
Q89. Among the eight components (PC2, Server, Printer, Hub, and Cables *a* through *d*) of the LAN, how many can be considered as a candidate (or candidates) for the cause of the failure?

a) 1 b) 2 c) 3 d) 4

Q90. In order to isolate the cause of the failure, Mr. *M* checked if he could print from PC2. He then repeated the test after switching the connection on the Hub end for Cables *c* and *d*, which are connected to PC1 and PC2, respectively. If Mr. *M* succeeds in printing from PC2 in both cases above, how many components can be considered as a candidate (or candidates) for the cause of the failure among the eight components (PC2, Server, Printer, Hub, and Cables *a* through *d*)?

a) 0 b) 1 c) 2 d) 3

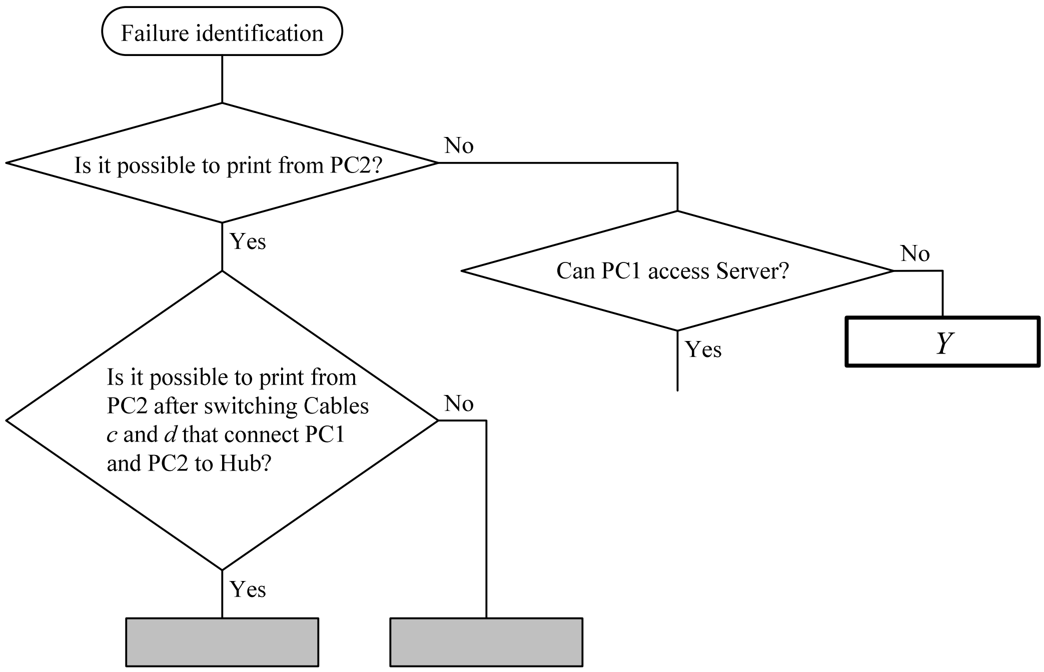
Q91. Mr. *M* decides to make a flowchart of the procedure for identifying the failure cause. Which of the following is the appropriate statement for *X* in the flowchart below? Here, the flowchart is not completed.



Note: The shaded box is intentionally left blank.

a) Suspecting that the "socket" connecting PC1 to Hub is defective
b) Suspecting that "Cable *c*" connecting PC1 to Hub is defective
c) Suspecting "Cable *b*" connecting Printer to Hub is defective
d) Suspecting that "Printer" is defective

Q92. Mr. *M* continued working on the flowchart of the procedure for identifying the failure cause. Which of the following is the appropriate statement for *Y* in the flowchart below? Here, the flowchart is not completed.



Note: The shaded boxes are intentionally left blank.

a) Suspecting that "Hub" is defective
b) Suspecting that "Cable *b*" connecting Printer to Hub is defective
c) Suspecting that "Cable *b*" connecting Printer to Hub or "Hub" is defective
d) Suspecting that "Printer" is defective

Question B

Read the following description concerning member data analysis, and then answer **Q93** through **Q96**.

Mr. *A* is an employee of a fitness center. He decides to analyze the usage of the facility based on the data stored in the member management system, using a database application on his PC. From the Member table and the Check-in table with their structures shown in Fig. 1, Mr. *A* retrieved the data for one month of usage by members in the age groups of 20s through 50s.

Member table

Membership_number	Member_name	Sex	Age

Check-in table

Membership_number	Date	Checkin_time

Fig. 1 Data structure of the Member table and the Check-in table

Using the data retrieved from the Member and Check-in tables, Mr. A created a Usage analysis table with the structure shown in Fig. 2.

Usage analysis table

Membership_number	Member_name	Sex	Age	Date	Checkin_time

Fig. 2 Data structure of the Usage analysis table

Based on the Usage analysis table, Mr. *A* created a list showing the number of visits by age group and sex, as shown below. The values show the gross number of visits during the month.

Table Visit counts by age group and sex

Sex	Age group	Visit count (persons)
Male	20s	56
	30s	114
	40s	227
	50s	295
	Sub total	692
Female	20s	100
	30s	215
	40s	348
	50s	227
	Sub total	890

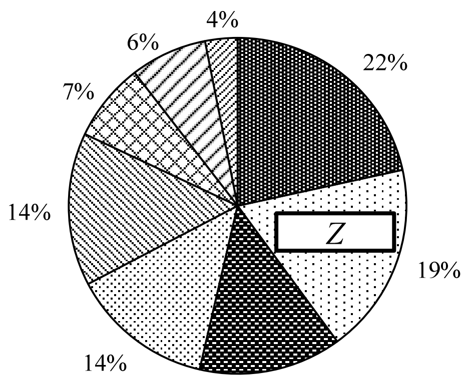
Q93. Which of the following is the appropriate method for creating the Usage analysis table shown in Fig. 2?

a) Join the Member table and the Check-in table using Membership_number as a key.
b) Sort the Member table by Membership_number, and then project from the Check-in table.
c) Select the Member table using Membership_number of the Check-in table as a key.
d) Sort the Check-in table by Membership_number, and then select the Member table.

Q94. Which of the following is an appropriate analysis based on the list of visit counts by age group and sex?

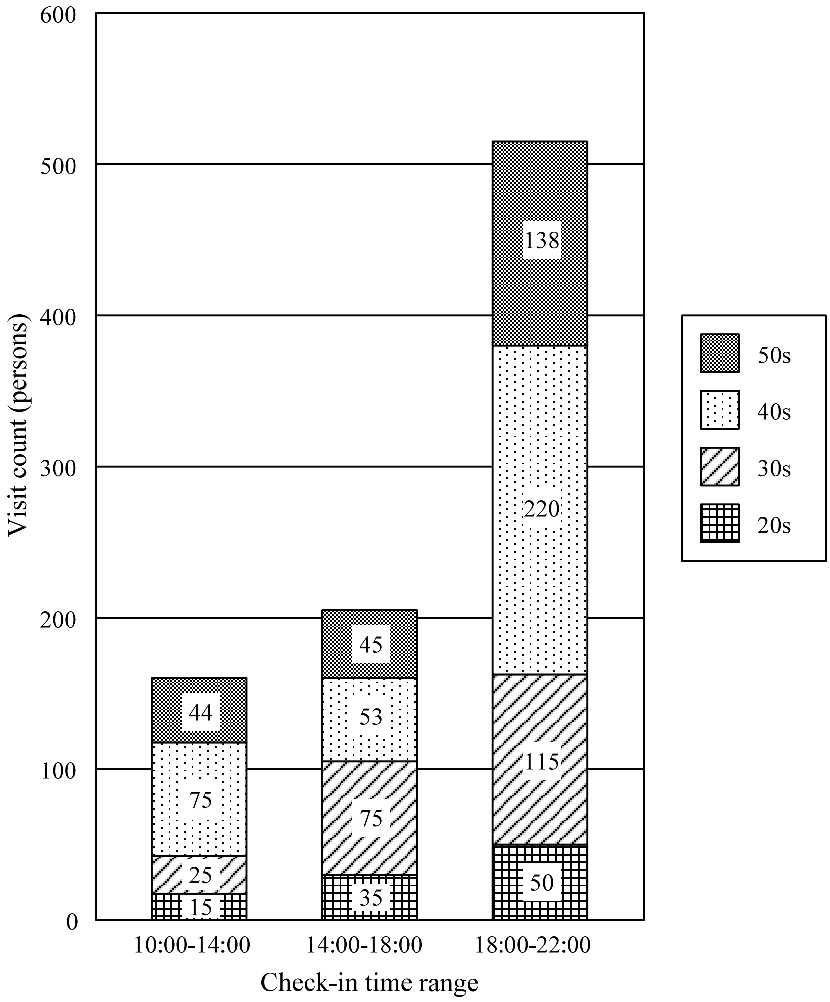
a) The number of visits by females in their 30s is greater than that of males in their 40s.
b) When compared within the same age group, the number of visits is always greater for females.
c) The age group with the largest number of visits is 50s for males and 40s for females.
d) When compared between age groups, 50s is the age group with the largest number of visits for both male and female.

Q95. A chart is created to visualize the composition ratio of visit counts by age group and sex. Which of the following is the appropriate label for *Z* in the chart below that represents the percent distribution by sex and age?



a) Female, 30s
b) Female, 40s
c) Male, 40s
d) Male, 50s

Q96. A chart is created to visualize how the number of visits by female members changes over time for each age group and check-in time range. Which of the following is an appropriate observation based on an analysis of the chart?



a) The increase rate for 40s from 14:00-18:00 to 18:00-22:00 is greater than that for 30s from 10:00-14:00 to 14:00-18:00.

b) When comparing the time periods 10:00-14:00 and 14:00-18:00, the number of people in their 50s shows the largest increase rate.

c) When comparing the time periods 14:00-18:00 and 18:00-22:00, the number of people in their 30s shows the largest increase rate.

d) All age groups show an increase in the number of visits for later time periods.

Question C

Read the following description concerning a mail-order business, and then answer **Q97** through **Q100**.

A mail-order company *F* receives an almost consistent volume of orders every week. Orders received during the week are processed for shipment in the following week. All orders for a particular week must be shipped by the end of the following week.

Mr. *A* handles a sequence of business tasks (hereinafter called sales operation), from the acceptance of an order to its shipment. When Mr. *A* is not available for reasons such as a vacation, Mr. *B* handles the sales operation.

The table below shows the average number of hours per week required by Mr. *A* and Mr. *B* to complete the sales operation. Here, the work schedule for Company *F* is five days a week from Monday to Friday, eight hours a day.

Table Average hours per week required to complete the sales operation with one staff

Staff	Average hours (hours/week)
Mr. *A*	36
Mr. *B*	45

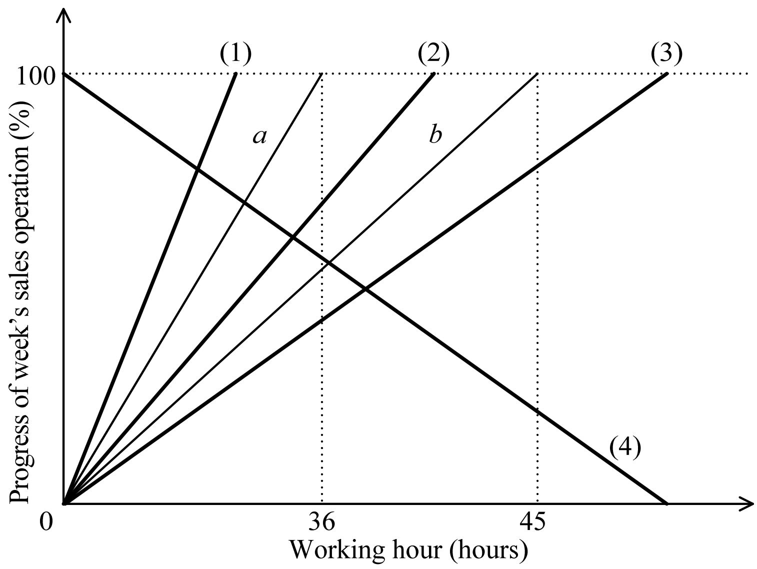
The table shows that Mr. *A* needs 36 hours to complete a week's sales operation when he works alone. This means that Mr. *A* can complete $\frac{1}{36}$ of an entire week's work volume in one hour. Sometimes, both Mr. *A* and Mr. *B* are assigned to the sales operation at the same time. In this case, they complete $\frac{1}{36}+\frac{1}{45}$ of an entire week's work volume in one hour.

Q97. Which of the following is the ratio of the work volume Mr. *A* can complete by himself in one day to an entire week's work volume?

a) $\frac{1}{8}$ b) $\frac{5}{36}$ c) $\frac{1}{6}$ d) $\frac{2}{9}$

Q98. The graph below shows the relationship between the working hours and the progress within a week when Mr. *A* or Mr. *B* works alone on the sales operation. Lines *a* and *b* represent the relationship between the working hours and the progress for Mr. *A* and Mr. *B*, respectively.

Which of the following is the line that represents the relationship the working hours and the progress within a week when both Mr. *A* and Mr. *B* are assigned to the sales operation at the same time?



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

Q99. If both Mr. *A* and Mr. *B* are assigned to the sales operation at the same time from the first day of the week, how many hours are required to complete an entire week's operation?

a) 19 b) 20 c) 40 d) 41

Q100. On a particular week, Mr. *B* handled the sales operation on Monday, and Mr. *A* handled the sales operation from Tuesday onward. Approximately how many hours does Mr. *A* need to finish the remaining sales operation for the week?

a) 20 b) 25 c) 30 d) 35

Spreadsheet Software Functions and Terminology

The following defines the basic functions and terminologies of spreadsheet software.

1. Worksheets

   Worksheet is the work area within spreadsheet software. A worksheet has 256 columns (columns A through Z, followed by AA through AZ, then BA through BZ, up to column IV) and 10,000 rows (row 1 through row 10,000).

2. Cells

   (1) An intersection of a column (vertical) and a row (horizontal) on a worksheet is called a cell. The cell at Column A and Row 1 is represented as A1.

   (2) A group of cells that form a rectangular shape can be selected as a range. A range is represented, for example, as "A1:B3".

   (3) A name can be assigned to any range. A name is assigned to a range by using [ ] (square brackets), for example, "the range of cells 'A1:B3' is named [Price]."

   (4) A cell that contains no data is called a blank cell.

3. Cell data entry

   (1) Numeric values, character strings, and expressions can be entered to a cell.

   (2) Cells can be protected to prevent data entry. When cell protection is turned off, data entry is allowed again.

   (3) The entry of a numeric value 5 into cell A1 is represented as "Enter 5 into cell A1."

   (4) The entry of a character string ABC into cell B2 is represented as "Enter 'ABC' into cell B2."

   (5) The entry of an expression for the sum of cell A1 and cell B2 into cell C3 is represented as "Enter the expression 'A1+B2' into cell C3."

4. Cell display format

   (1) A numeric value in a cell is displayed right justified.

   (2) A character string in a cell is displayed left justified.

   (3) An expression in a cell is displayed left justified if the result is numeric, and right justified if the result is a character string.

   (4) The display format for each cell can be changed to left justified, centered, or right justified.

5. Calculating formula

   (1) Mathematical expressions can be used in calculating formula.

   (2) Arithmetic operators available for use in a calculating formula include "+" (addition), "–" (subtraction), "*" (multiplication), "/" (division), and "^" (exponentiation).

   (3) The arithmetic operators are processed according to the standard order of mathematical precedence.

6. Recalculation

   (1) When a calculating formula is entered into a cell, the calculation result is displayed immediately.

(2) When the value of a cell changes, values of other cells that refer to that cell will be automatically recalculated. This recalculation is performed only once, in the sequence A1, A2, A3, …, B1, B2, B3, ..., and so on.

7. Functions

(1) The functions defined in the table below are available for use in a calculating formula.

Function name and example	Description
SUM (A1:A5)	Calculates the sum of the values in cells A1 through A5.
AVERAGE (B2:F2)	Calculates the average of the values in cells B2 through F2.
SQUAREROOT (I6)	Calculates the positive square root of the value in cell I6 (which must be a positive value).
STANDARDDEVIATION (D5:D19)	Calculates the standard deviation of the values in cells D5 through D19.
MAX (C3:E7)	Returns the largest value from the values in cells C3 through E7.
MIN ([Score])	Returns the smallest value from the values within the range called [Score].
IF (B3>A4, 'Chicago', 'Washington')	Returns the second argument if the logical expression specified in the first argument is TRUE (valid), or the third argument if FALSE (invalid). In the example on the left, if the value in cell B3 is greater than the value in cell A4, the character string 'Chicago' is returned. Otherwise, 'Washington' is returned. In logical expressions, comparison operators =, ≠, >, <, ≤, ≥ can be used. "IF" functions can be specified as the second or the third arguments to construct a nested "IF" function.
COUNT (G1:G5)	Counts the number of non-blank cells in cells G1 through G5.
COUNTIF (H5:H9, '>25')	Counts the number of cells within the range specified in the first argument that meet the condition specified in the second argument. In the example on the left, in cells H5 through H9, the number of cells that contain a value greater than 25 is returned.
INTEGER (A3)	Calculates the maximum integer that does not exceed the number in cell A3 (must be a numeric number). Example: INTEGER (3.9) = 3 INTEGER (−3.9) = −4

MODULO (C4, D4)	Calculates the remainder after the value in cell C4 (dividend) is divided by the value in cell D4 (divisor). The result will always have the same sign as the divisor. MODULO and INTEGER functions satisfy the following relationship: MODULO (x, y) = x – y ∗ INTEGER (x/y)
AND (Logical expression 1, Logical expression 2, ...)	Returns TRUE if all the logical expressions specified as arguments evaluate to TRUE. Returns FALSE if any one arguments is FALSE. Any number of logical expressions can be specified as arguments.
OR (Logical expression 1, Logical expression 2, ...)	Returns FALSE if all logical expressions specified as arguments evaluate to FALSE. Returns TRUE if any one of the logical expressions is TRUE. Any number of logical expressions can be specified as arguments.
NOT (Logical expression)	Returns TRUE if the logical expression specified as the argument evaluates to FALSE, and returns FALSE if the argument evaluates to TRUE.
Note: SUM, AVERAGE, STANDARDDEVIATION, MAX, and MIN functions ignore cells that are within the specified range but do not contain a numeric value.	

(2) An argument of a function can be specified using a calculation formula that uses cells, a range, a range name, or a logical expression.

8. Copying of cells

(1) A numeric value, character string, or expression entered into a cell can be copied into other cells.

(2) If an expression referring to another cell is copied, the copied expression will be changed automatically based on relative reference. For example, when the function SUM (A1:A5) in cell A6 is copied to cell B7, cell B7 will contain the expression SUM (B2:B6).

9. Absolute references

(1) A reference that is not changed even when an expression is copied into another cell is called absolute reference, and is represented using the $ (dollar) symbol, as in A1. For example, when an expression A1+5 in cell B1 is copied into cell C4, the expression in cell C4 will remain as A1+5.

(2) A mixed reference is also possible, where either the column or the row is an absolute reference, as in $A1 and A$1. For example, when the expression $C1−3 in cell D2 is copied into cell E3, cell E3 contains the expression $C2−3. Likewise, when the expression F$2−3 in cell G3 is copied into cell H4, cell H4 contains the expression G$2−3.

10. Macros

(1) Macros can be stored within a spreadsheet. Macros are represented as Macro *P*, Macro *Q*, and so on.

(2) Some examples of instructions concerning macros are as follows: "Run Macro *P* to save the spreadsheet," "Register the procedure for sorting cells A1 through A10 in ascending order as

Macro *Q*," "Macro *R*: enter numeric values," and "Extract records for which the data in Column C is less than the specified value."

11. Others

The spreadsheet software shall be equipped with the same functions as most commercially-available spreadsheet software, including the grid line and graph/chart functions in addition to "Save", "Read", and "Print".