

**There are 40 questions in this paper. Choose the most suitable answers.**

**1. A Hong Kong identity card number is wrongly entered into a computer system, as shown below:**

<u>Original number</u>	<u>Wrong input</u>
A123456(3)	A213456(3)

**Which of the following can help detect this error?**

- (1) Range check
- (2) Input data twice
- (3) Check digit

- A. (1) and (2) only
- B. (1) and (3) only
- C. (2) and (3) only
- D. (1), (2) and (3)

**2. Which of the following decimal values is equivalent to 1010 0001 in 8-bit two's complement representation?**

- A. 33
- B. -33
- C. 95
- D. -95

**3. Amy uses JPG format instead of BMP format when scanning photos. What is/are the possible reason(s) for this?**

- (1) To decrease the file size of the photos
- (2) To increase the number of pixels per photo
- (3) To increase the number of colours displayed

- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

**4. A company has 30 000 employees. Each employee has a staff number. What is the minimum number of bits required to represent the staff numbers?**

- A. 5
- B. 14
- C. 15
- D. 32

**5. Assume that  $X = 2$  and  $Y = 3$ . Which of the following Boolean expressions returns TRUE?**

- A.  $((X > Y) \text{ AND } (Y > 4)) \text{ OR } (1 > X)$
- B.  $((X < Y) \text{ AND } (Y > 4)) \text{ OR } (1 > X)$
- C.  $(X > Y) \text{ AND } ((Y < 4) \text{ OR } (1 < X))$
- D.  $(X < Y) \text{ AND } ((Y < 4) \text{ OR } (1 < X))$

6. Which of the following character sets can be used to represent simplified Chinese characters, traditional Chinese characters and English characters?

- (1) ASCII
- (2) Unicode
- (3) GB code

- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

7. What of the following is/are the benefit(s) of e-government?

- (1) Government information can be more easily accessed by the public in digital format.
- (2) The data security of the government information is enhanced.
- (3) The digital divide in society can be closed.

- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

8. Mary sends an email with a document in PDF instead of DOC format. What is/are the possible reason(s) for this?

- (1) The document can be encrypted.
- (2) The page layout of the document can be preserved.
- (3) Multimedia elements can be included.

- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

9. Ms Li plans to design and produce student result slips using student information and examination marks stored in a database. What should she do?

- A. Create reports using database software.
- B. Create hyperlinks to the database using word processing software.
- C. Create SQL commands using spreadsheet software.
- D. Import data and create a pivot table using spreadsheet software.

10. For which of the following tasks should spreadsheet 'what-if' scenarios be created?

(1) Find the students who are awarded 90 marks or above in a Mathematics examination.

(2) Estimate the cost of a product produced by different manufacturers.

(3) Create a chart of monthly average temperatures.

- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

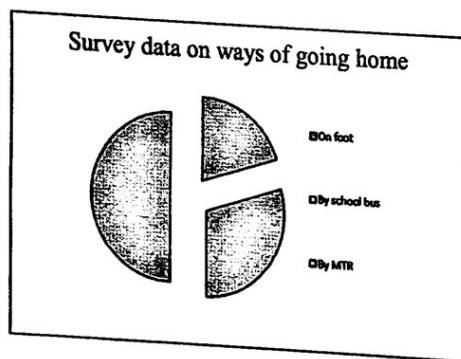
11. There are 6 records in a database table PET, as shown below:

PID	WEIGHT	PTYPE
103	15	A
105	18	P
106	12	P
109	30	D
110	4	P
112	30	D

What value(s) will be included in the output of the following SQL statement?

```
SELECT SUM(WEIGHT) FROM PET GROUP BY PTYPE
```

- (1) 109
  - (2) 15
  - (3) 34
  - (4) 60
- A. (1) only  
B. (2) only  
C. (3) and (4) only  
D. (2), (3) and (4) only
2. A teacher creates a presentation which includes the following slide.



Which element(s) of the slide should the teacher edit to create a more attractive presentation?

- (1) SQL
  - (2) Font
  - (3) Chart
- A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only
1. Which of the following processes is an example of data collection?
- A. Taking Towngas meter readings
  - B. Inserting a bank card into an automated teller machine
  - C. Putting a photo on a scanner for scanning
  - D. Entering test marks written on a mark sheet into a spreadsheet

Answer Questions 14 and 15 with reference to the following specifications of computers X, Y and Z. All computers use the same operating system.

	X	Y	Z
CPU	Quad-core, 2.8 GHz	Dual-core, 1.8 GHz	Quad-core, 2.4 GHz
RAM	4 GB	2 GB	4 GB
Storage device	2TB hard drive	512 GB SSD	512 GB SSD
Network	LAN port (1000 Mbps)	802.11ac WiFi	LAN port (1000 Mbps) 802.11ac WiFi

14. Which computer(s) has/have the best computational power?

- A. X
- B. Y
- C. Z
- D. Y and Z

15. Which computer(s) take(s) the shortest time to boot up?

- A. X
- B. Y
- C. Z
- D. X and Z

16. Which of the following is not an advantage of an SSD over a hard drive?

- A. Consumes less electricity.
- B. Generates less heat.
- C. Supports random access.
- D. Provides a higher access speed.

17. Which of the following descriptions of a driver program is correct?

- A. Enables the operating system to manage files.
- B. Enables the operating system to control a scanner.
- C. Monitors the status of virus checking.
- D. Monitors the usage of RAM.

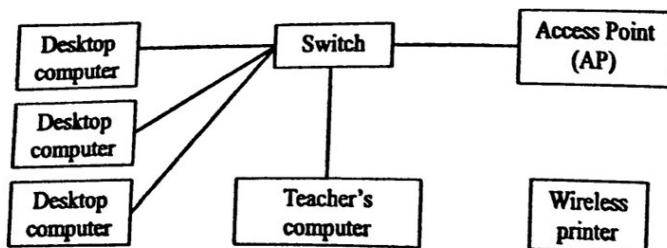
18. Consider the following instruction.

Address	Instruction	Description
1000	STORE 1111	Store the content of the accumulator into the main memory with the address 1111

In the fetch-decode-execute cycle, what does 'fetch' do?

- A. Obtains the instruction from the main memory with the address 1000.
- B. Obtains the instruction from the main memory with the address 1111.
- C. Obtains the content of the accumulator.
- D. Calculates the address of the next instruction by using the control unit (CU).

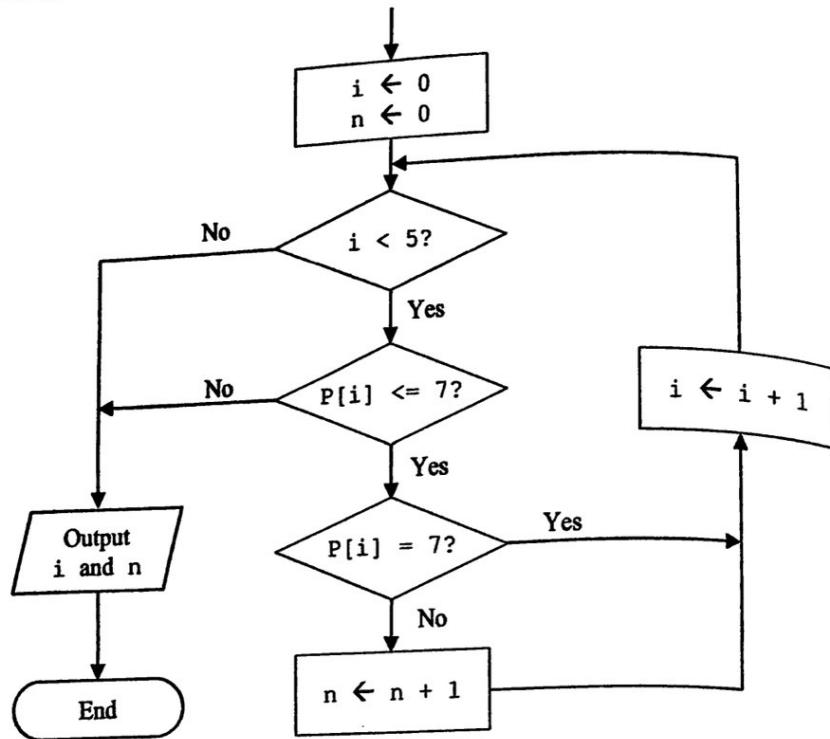
Answer Questions 19 and 20 with reference to the following network diagram.



19. What service will the teacher's computer commonly provide for the desktop computers?
- (1) File sharing
  - (2) Email
  - (3) Web browsing
- A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only
20. In order to allow all desktop computers to connect to the wireless printer, which of the following action should be taken?
- A. The AP should be installed between the switch and teacher's computer.
  - B. The teacher's computer should be turned on.
  - C. The switch should be replaced by a router.
  - D. The wireless printer should be connected to the AP.
21. Which of the following only support(s) sequential access?
- (1) DVD-RW
  - (2) Magnetic tape
  - (3) Flash memory
- A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only
22. Which of the following statements about the components in a computer is not correct?
- A. The arithmetic and logic unit (ALU) is used to perform arithmetic operations.
  - B. The accumulator is a register that stores arithmetic and logic results.
  - C. The data transfer rate of registers is higher than that of the main memory.
  - D. Data buses are used to transfer control signals between the main board and input/output devices.
23. Which of the following is not appropriate for enhancing students' information literacy?
- A. Watching documentaries about the ocean online
  - B. Searching for the installation password of a software package through an online discussion forum
  - C. Reading school newsletters through the school intranet
  - D. Finding the history of computers through the Internet

24. Which of the following can improve the quality of video conferencing?  
(1) A camera with a higher resolution  
(2) A larger storage capacity  
(3) A higher network bandwidth
- A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only
25. Which of the following protocols is/are involved when browsing <https://www.gov.hk>?  
(1) FTP  
(2) IP  
(3) DNS
- A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only
26. Which of the following can be used to identify a host computer on the Internet?  
(1) Email address  
(2) IP address  
(3) Computer name
- A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only
27. What is the main function of a network interface card?  
A. To find a route for sending data packets  
B. To make a computer communicate over a network  
C. To enhance the security level of a communication link  
D. To support satellite communication
28. When Eva logs on to a web site, she will receive an SMS message on her phone with a password. What is the SMS message about?  
A. Parity checking  
B. Digital watermark  
C. Digital signature  
D. Authentication

Answer Questions 29 and 30 with reference to the following segment of a flowchart. The initial values of  $P[0]$ ,  $P[1]$ ,  $P[2]$ ,  $P[3]$  and  $P[4]$  are 7, 7, 6, 7 and 9 respectively.



29. What is the output value of  $i$ ?

- A. 2
- B. 3
- C. 4
- D. 5

30. What is the output value of  $n$ ?

- A. 1
- B. 2
- C. 3
- D. 4

31. What is the output of the following algorithm?

```

N ← 10
K ← 0
While N < 14 do
  K ← K + N
  N ← N + 1
Output K
  
```

- A. 14
- B. 33
- C. 46
- D. 60

What is the output of the following algorithm?

32.

```
P ← 0
Q ← 1
For i from 1 to 5 do
    If i < 2 then
        Output i
    else
        R ← P + Q
        P ← Q
        Q ← R
    Output R
```

- A. 1 1 2 2 4
- B. 1 1 2 3 5
- C. 1 2 3 4 5
- D. 1 2 4 8 16

What is the output of the following algorithm?

33.

```
P ← 1
Q ← 2
Repeat
    P ← P + 1
    Q ← Q * 2
Until (P > 4)
Output Q
```

- A. 4
- B. 5
- C. 16
- D. 32

34. A bank updates its automatic teller machine system with new restrictions on cash withdrawals, as follows:

- Available cash notes \$100, \$500 and \$1 000
- Minimum withdrawal amount = \$200
- Maximum withdrawal amount = \$10 000

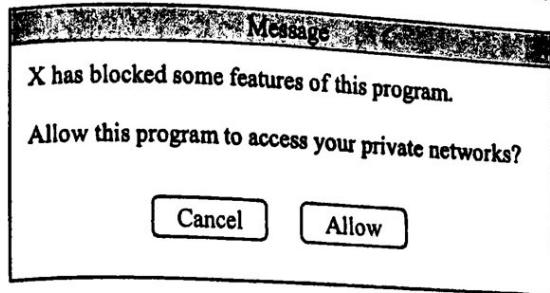
Which of the following sets of withdrawal amounts should be used as test data for this system update?

- A. 50, 500, 7 000, 8 000, 9 000, 10 000
- B. 100, 200, 300, 500, 1 000, 30 000
- C. 100, 200, 600, 950, 10 000, 11 000
- D. 100, 1 000, 15 000, 20 000, 25 000, 30 000

35. A student is addicted to online gaming and plays more than 8 hours every day. Which of the following health problems might he encounter?  
(1) Sleep problems  
(2) Vision problems  
(3) Emotional problems
- A. (1) and (2) only  
B. (1) and (3) only  
C. (2) and (3) only  
D. (1), (2) and (3)
36. In a computer network, which of the following can protect a user's privacy from a hacker attack?
- (1) Create backup of data.  
(2) Update the operating system.  
(3) Install a firewall.
- A. (1) and (2) only  
B. (1) and (3) only  
C. (2) and (3) only  
D. (1), (2) and (3)
37. What is/are the major characteristic(s) of open source software?
- (1) Developers can set the selling price.  
(2) Users can change the source code.  
(3) All functions of the software can be used during the trial period.
- A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only
38. An online shop collects its members' personal information. Which of the following actions is/are not appropriate without members' consent?
- (1) The shop encrypts and uploads all personal information to cloud storage.  
(2) The shop sends all personal information to other online shops which provide other services to members.  
(3) When a member unregisters his/her membership, the shop keeps the personal information permanently to help with his/her re-registration in the future.
- A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only

39.

When Peter installs a game from a hyperlink sent by his friend, a dialogue box pops up, as shown below:

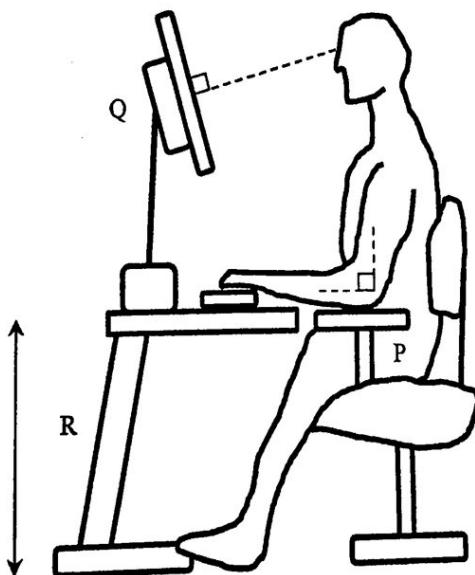


What is X in the dialogue box?

- A. Firewall
- B. Browser
- C. File manager application
- D. Device manager application

40.

The picture below illustrates good ergonomic practices for using a computer.



Which of the following settings are necessary?

- (1) The angle of the armrest at P should be adjustable.
- (2) The angle of the display unit at Q should be adjustable.
- (3) The height of the table at R should be adjustable.

- A. (1) and (2) only
- B. (1) and (3) only
- C. (2) and (3) only
- D. (1), (2) and (3)

**END OF SECTION A**

**Answer all questions.**

1. A school designs a database table, STUDENT, to store the test marks of Secondary One students. Some records are listed below:

**STUDENT**

CODE	SNAME	TEST1	TEST2
1A01	Wong Ka Ka	90	92
1A02	Chan Tai Man	65	98
1A03	Li Lai Kit	39	64
1A04	Ho Tin Man	89	47
1B01	Lee Lai Lai	67	31
1B02	Cheung Hoi Yan	56	54

- (a) Each data entry in CODE consists of the class name and class number of a student. Describe a validation check for CODE.

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(1 mark)

- (b) Based on the six records given in STUDENT, what is the output after executing the following SQL statement?

SELECT SNAME FROM STUDENT WHERE TEST1 > 90 OR TEST2 > 90

(2 marks)

- (c) Some students are absent from the tests and this information should be recorded in STUDENT.

- (i) It has been suggested that either 'ABS' or 0 should be stored in TEST1 and TEST2 to represent absence. Give a disadvantage of each suggestion.

'ABS' \_\_\_\_\_

0 \_\_\_\_\_

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

(ii) The school decides to store -1 in TEST1 and TEST2 to represent absence. What precaution should be taken when doing computation work on STUDENT?

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(2 marks)

The school uses a spreadsheet to arrange new classes for the students who are promoted to Secondary Two, as shown below:

	A	B	C	D	E
1	Student Code	Name	Gender	New Class	
2	1A01	Wong Ka Ka	F	2A	
3	1A02	Chan Tai Man	M	2B	
4	1A04	Ho Tin Man	M	2C	
5	1B02	Cheung Hoi Yan	F	2D	
:	:	:	:	:	
100	1D29	Cheung Yat Sun	M	2C	
101	1D30	Cheung Chi Ming	M	2D	
102					
103	Class	M	F		
104	2A				
105	2B				
106	2C				
107	2D				

(d) The following steps are used to find the number of male students ('M') and the number of female students ('F') assigned to each class and store the values in B104:C107.

Step 1: To combine the content of columns C and D into column E, the teacher enters the formula  
 $=CONCATENATE(C2, D2)$  in E2 and then copies it to E3:E101.

Step 2: The teacher enters a formula in B104 and then copies it to B105:C107.

(i) Write down the value stored in E101. \_\_\_\_\_  
(1 mark)

(ii) Complete the formula in B104 below.

$=COUNTIF(_____, "M") + COUNTIF(_____, "F")$

(3 marks)

Answers written in the margins will not be marked.

Eva plans to improve the system software in a software product.

2. (a) Give two major differences between system software and application software.

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(2 marks)

Eva writes an algorithm involving integers, as follows:

<u>Line number</u>	<u>Content</u>
10	Input A, B
20	Repeat
30	If A < B then
40	T $\leftarrow$ A
50	_____ $\leftarrow$ _____
60	_____ $\leftarrow$ _____
70	A $\leftarrow$ Remainder of (A/B)
80	until (A = 0 or B = 0)
90	Output (A + B)

- (b) Lines 40 to 60 are used to swap the contents of A and B. T is a temporary variable. Complete the pseudocode above.

(2 marks)

- (c) (i) Suppose that the input values for A and B are 9 and 15 respectively. Write down the contents of A and B after each pass on Line 80.

Iteration	A	B
First		
Second		
Third		

(3 marks)

- (ii) Suppose that the input values for A and B are the same positive integer. How many times will Line 80 be executed?

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(1 mark)

(d) Eva adds the following pseudocode after Line 10 to ensure that the initial values for A and B are positive. Complete the pseudocode.

```
while (A _____ 0) _____ (B _____ 0) do  
    output "Invalid input!"  
    Input A, B
```

(e) Eva rewrites Lines 30 to 70 using an 'If-then-else' statement, as shown below. Complete the statement below. (2 marks)

If  $A < B$  then

$B \leftarrow$  \_\_\_\_\_

else

$A \leftarrow$  \_\_\_\_\_

(2 marks)

John helps a clinic to modernise its IT equipment.

3. (a) John installs a web camera in the waiting area for security purposes.

(i) John chooses to use MP4 format instead of AVI format to create a backup of the videos captured by the web camera. Give one reason to support his choice.

- (ii) John finds that a 1-minute video takes up approximately 10 MB. Calculate the required storage capacity of a daily backup in GB. Show your calculation. (1 mark)

- (iii) A doctor can view a video in the daily backup through the Internet when out of the clinic. Briefly describe how the video file is transmitted over the Internet with reference to the concepts of data packets and the Internet Protocol (IP). (2 marks)

- (iv) A doctor in his consultation room can view the waiting area. Give two technical issues relating to streaming that John should consider when designing a streaming service. (2 marks)

(2 marks)

- (b) Describe two things John should consider when setting up a new lighting system and curtains in the clinic with reference to ergonomics of the workspace for using computers.

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(2 marks)

- (c) John installs an electronic lock on the door of the consultation room. The doctor can use his fingerprint or a smart card to open it.

- (i) Suggest another biometric authentication method which can be used to open a door.

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(1 mark)

- (ii) Give two disadvantages of using the smart card instead of biometric authentication methods to open the door.

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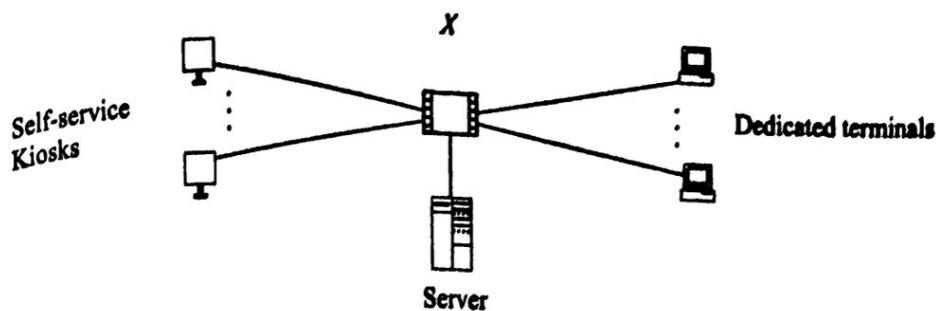
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(2 marks)

Peter plans to install some self-service kiosks in his fast food restaurant so that customers can order food by themselves. Customers can still order food through cashiers using dedicated terminals, however. The LAN in the fast food restaurant is shown below:



- (a) (i)  $X$  is a network connecting device. What should  $X$  be? \_\_\_\_\_ (1 mark)

- (ii) Describe two major network services for the dedicated terminals provided by the server.

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(2 marks)

- (b) Below are two sample screens captured from the touch screen of a kiosk:

Meal	Ice-cream	$\ominus$	0	$\oplus$
Drink	Apple pie	$\ominus$	1	$\oplus$
Dessert	Cheesecake	$\ominus$	0	$\oplus$
	Fruit tart	$\ominus$	3	$\oplus$
Snack	Cookie	$\ominus$	0	$\oplus$
	Donut	$\ominus$	0	$\oplus$
Checkout				

Meal	Cheese burger	$\$30 \times 4$
Drink	Ice lemon tea	$\$20 \times 4$
Dessert	Apple pie	$\$10 \times 1$
	Fruit tart	$\$10 \times 3$
Snack	French fries	$\$20 \times 4$
	Total =	$\$320$
Checkout	Confirm?	<input type="button" value="YES"/> <input type="button" value="NO"/>

- (i) Describe two advantages of using the  $\ominus$  and  $\oplus$  buttons.

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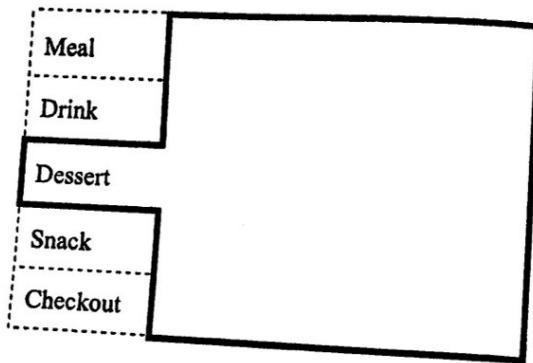
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(2 marks)

(ii) Twenty different dessert items will be added to the menu. Draft a user-friendly design for including the new dessert items and describe your design briefly.



- (c) Give two technical reasons why a thermal printer is commonly used instead of a laser printer in self-service kiosks in fast food restaurants. (2 marks)

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(2 marks)

Answers written in the margins will not be marked.

(d) Many fast food restaurants plan to install self-service kiosks to replace some dedicated terminals.

(i) How will this change affect the nature of the work done in the fast food restaurants?

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(2 marks)

(ii) What is the benefit to customers of this change?

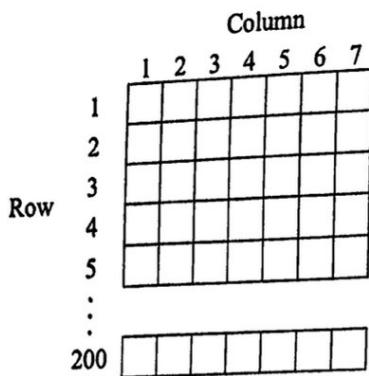
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(1 mark)

Answers written in the margins will not be marked.

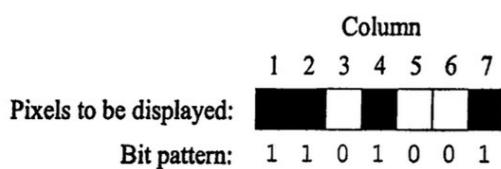
5. A computer controls a display consisting of  $200 \times 7$  pixels, as shown below:



A white pixel and a black pixel are represented by '0' and '1' respectively. Method 1 and Method 2 are methods that use bit patterns to represent pixels in the display.

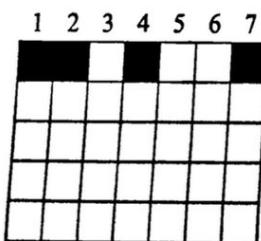
Method 1

A bit pattern consists of 8 bits. The first 7 bits represent a row of pixels and the 8th bit is always 1. The following example shows how 11010011 represents a row of pixels:



- (a) Complete the display below by drawing pixels to represent the following five bit patterns, in order.

11010011    10000011    10000011    10000011    01111101

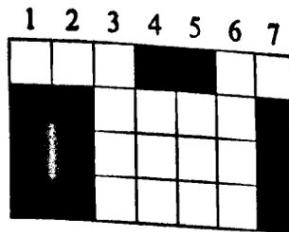


(2 marks)

Method 2

Similar to Method 1, if the 8th bit of a bit pattern is 1, the first 7 bits represent a row of pixels. If the 8th bit of a bit pattern is 0, the first 7 bits represent the number of occurrences (in binary notation) of the row of pixels represented by the next bit pattern.

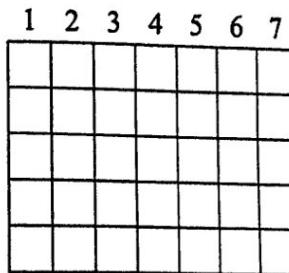
For example, 00011001 00000110 11000011 represent



Number of occurrences = 3

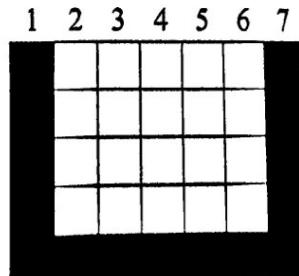
- (b) (i) Complete the display below by drawing the pixels represented by the following four bit patterns in order.

11111111 00000110 11010011 11111111



(2 marks)

- (ii) Write down the three bit patterns for representing the following display:



Bit patterns: \_\_\_\_\_ (2 marks)

- (iii) What is the maximum number of rows of pixels represented by two bit patterns?

\_\_\_\_\_ (2 mark)

(c) (i) In which type of memory, RAM or ROM, should the information about the pixels in the display be stored? Give a reason to support your choice.

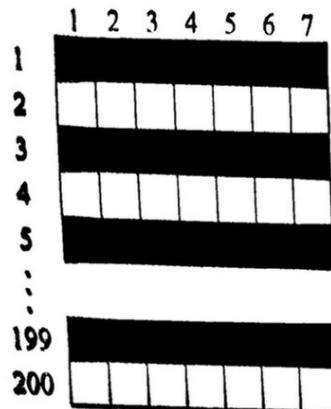
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(1 mark)

(ii) The following display consists of alternate rows of black pixels and white pixels. Compare the memory sizes needed for the following display represented by Method 1 and Method 2 respectively. Explain briefly.



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(2 marks)

(iii) In general, which method, Method 1 or Method 2, needs fewer computer resources? Explain briefly.

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(2 marks)

**END OF PAPER**

**Database (SQL commands – based on SQL-92 Standard)**

Constants	TRUE, FALSE
Operators	+,-,*,/,>,<,=,>=,<=,<>,%,_,', AND, NOT, OR
SQL	ABSOLUTE (ABS), AVG, INT, MAX, MIN, SUM, COUNT, AT, CHAR_LENGTH (LEN), LOWER, TRIM, SPACE, SUBSTRING (SUBSTR/MID), UPPER, AS, BETWEEN, BY, ASC, DESC, DISTINCT, FROM, GROUP, HAVING, LIKE, NULL, ORDER, SELECT, WHERE

**Electronic Spreadsheet**

Constants	TRUE, FALSE
Operators	+,-,*,/,<,>,=,<>,<=,>=
Functions	ABS, INT, RAND, SQRT, ROUND, AND, NOT, OR, CHAR, CONCATENATE (&), ISBLANK, LEFT, LEN, LOWER, MID, PROPER, RIGHT, TEXT, TRIM, UPPER, VALUE, AVERAGE, COUNT, COUNTA, COUNTBLANK, COUNTIF, MAX, MIN, RANK, SUM, SUMIF, FIND, VLOOKUP, IF