Cambridge International Examinations
Cambridge International Advanced Subsidiary Level and Advanced Level

Cambridge International A Level	

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

COMPUTING **9691/12**

Paper 1 **May/June 2014**

1 hour 30 minutes

Candidates answer on the Question Paper.

No additional materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
No marks will be awarded for using brand names for software packages or hardware.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **17** printed pages and **3** blank pages.

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CAMBRIDGE
International Examinations

[Turn over

1   Four types of storage, labelled **A**, **B**, **C**, **D** are shown in the table below.

(a) Four types of memory, media or devices are shown in the first column.

Consider each medium or device and put a tick (✓) in the appropriate column **A**, **B**, **C** or **D** indicate the type of storage to which it belongs.

You should only put one tick (✓) in each column.

	A	**B**	**C**	**D**
	primary memory storage	magnetic secondary storage	optical secondary storage	solid state secondary storage
DVD–RAM				
ROM				
hard disk				
flash memory				

[4]

(b) For the following applications, state which of the four types of storage **A**, **B**, **C** or **D** is the most appropriate.

Use each type of storage once only. Indicate your answer by circling **A**, **B**, **C** or **D**.

(i) to store the BIOS

A   **B**   **C**   **D**   [1]

(ii) to store the operating system and applications software

A   **B**   **C**   **D**   [1]

(iii) to allow simultaneous recording and playback by a video recorder with removable media

A   **B**   **C**   **D**
                                                                                                            [1]

(c) State **one** benefit and **one** drawback of using flash memory.

benefit ....

....

drawback ....

.... [2]
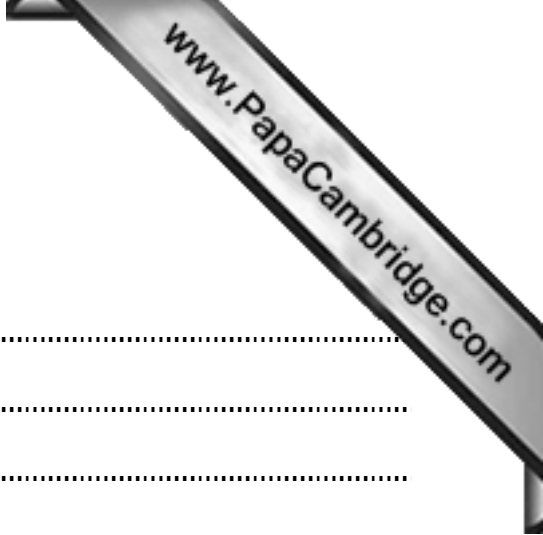
2   Describe one key difference between each of the following:

   (i) circuit switching and **packet switching**

   ....

   ....

   ....

   ....
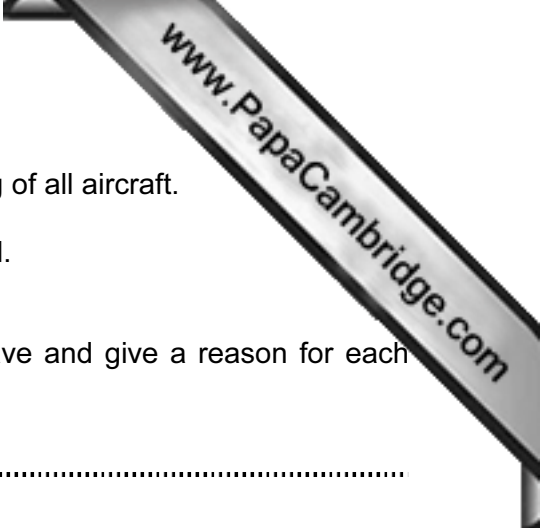
   .... [2]

   (ii) baseband and **broadband**

   ....

   ....

   ....

   ....

   .... [2]

   (iii) ring and **star network topologies**

   ....

   ....

   ....

   ....

   .... [2]

[Turn over

3 Staff at an airport control tower coordinate the take-off and landing of all aircraft.

A new system for use by the control tower staff is being developed.

(a) An interface is being designed for this new system.
Describe **two** features you would expect this interface to have and give a reason for each choice.

feature 1 ....

....

reason ....

....

feature 2 ....

....

reason ....

.... [4]

(b) The new system needs to be implemented safely using an appropriate method of changeover.

Name **one** appropriate method of changeover and give a reason for your choice.

method ....

reason for choice ....

....

....

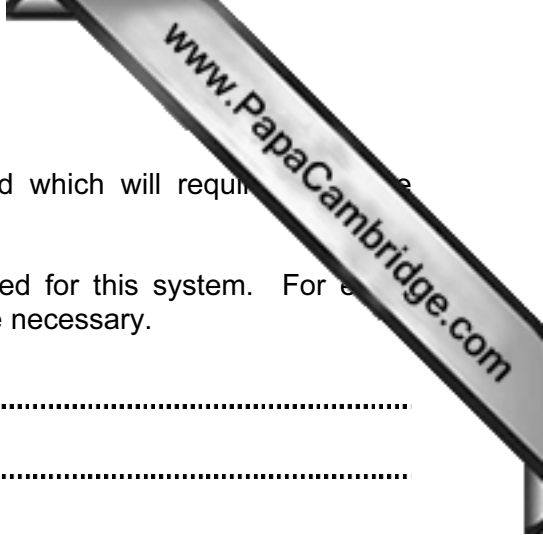Name **one** method of changeover that would not be appropriate and give a reason for your choice.

method: ....

reason for choice: ....

....

....

.... [2]

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(c) Once the system is in use, software errors may be found which will requi[re] maintenance.

Name **two** other types of maintenance that may be required for this system. For [each] describe a situation that would make this type of maintenance necessary.

type 1 ....

situation ....

....

....

type 2 ....

situation ....

....

.... [4]

[Turn over

4   A format check is a type of validation for an input string. A format check can be ~~performed~~
    using an input mask. An input mask consists of a string of characters which indicate t~~he~~
    character allowed in each character position.

    A software application uses the following codes for specifying an input mask.

character	meaning
0	a digit must be present
9	a digit may be present
T	a letter must be present
t	a letter may be present

   (a) The following input mask is used on each of the data items in the table below:

T	t	9	0	0	T	T

   Which of the following data items would pass or fail the format validation check?
   Put a tick (✓) in the appropriate column:

data item	pass	fail
K X 2 3 7 N		
N A 8 3 K K		
W 4 4 6 P Q		
C 2 4 3 3 Q		
R 4 9 N L		

[5]

(b) A car registration in country X has the following format:

1 letter - followed by 1, 2 or 3 digits - followed by 3 letters

(i) For this car registration format, give a suitable input mask:

[3]

(ii) Give **one** example of a car registration that would **pass** using your input mask:

[1]

(iii) Give **one** example of a car registration that would **fail** using your input mask:

[1]

[Turn over
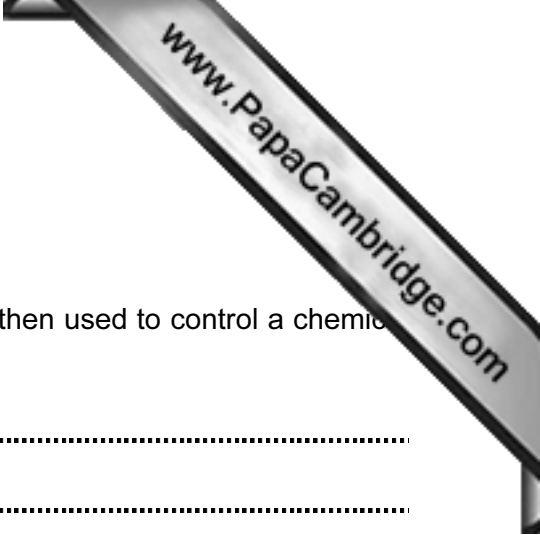
5   The following answers were seen on a Computing exam paper.

Explain why **each** of the answers is incorrect:

"Batch Processing involves collecting data from sensors which is then used to control a chemical plant. This data is then processed during the night in one go".

....

....

....

"One of the advantages of off-the-shelf software is that a programmer is not needed to write the software; therefore it is less expensive to produce".

....

....

....

"ROM is used to store data that is currently in use when running some applications software".

....

....

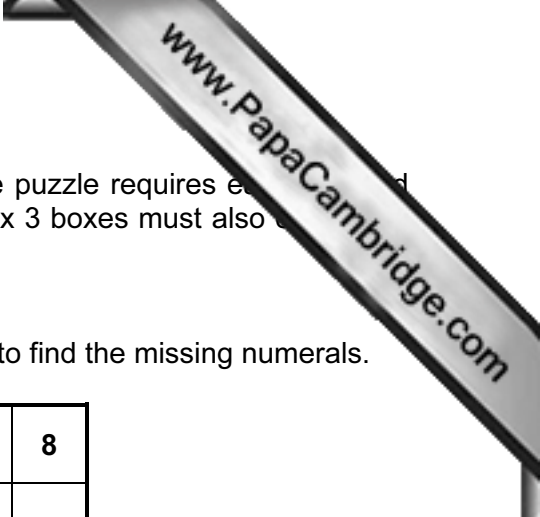...

"Sensors in a robot vacuum cleaner send signals directly to motors which turn the wheels thereby avoiding obstacles".

....

....

....

[4]

Question 6 begins on page 10.

6 A puzzle is made up of a 9 x 9 grid of cells. The solution to the puzzle requires e column to contain all the numerals 1 to 9. Each of the smaller 3 x 3 boxes must also the numerals from 1 to 9.

The following is an example of a partially completed puzzle.
Some of the numerals are shown. Logic then needs to be applied to find the missing numerals.

		7	1				5	8
6						3		
				4			6	9
7			5	8				
		5				8		
				3	2			5
9	2	6		1				
5	7	3						4
4	1	8			6	5		

(a) Describe a data structure that could be used to store such a puzzle.

....

....

....

.... [2]
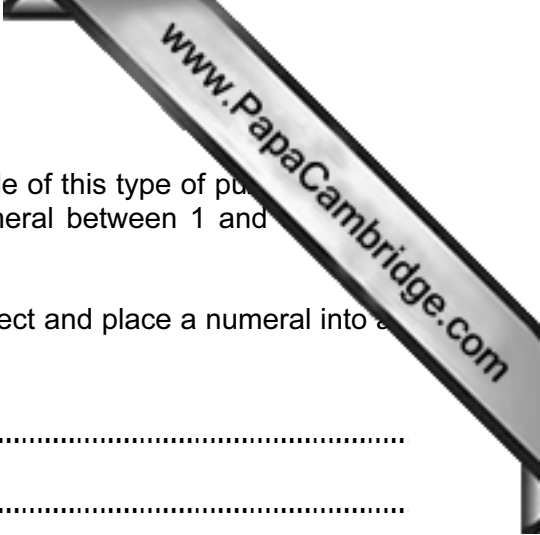
(b) (i) A computer application presents the user with an example of this type of pu~~~~ solve. The user selects a cell and then chooses a numeral between 1 and ~~~~ place in the cell; this is then repeated for all blank cells.

Describe a suitable user interface to allow the user to select and place a numeral into ~~~~ empty cell.
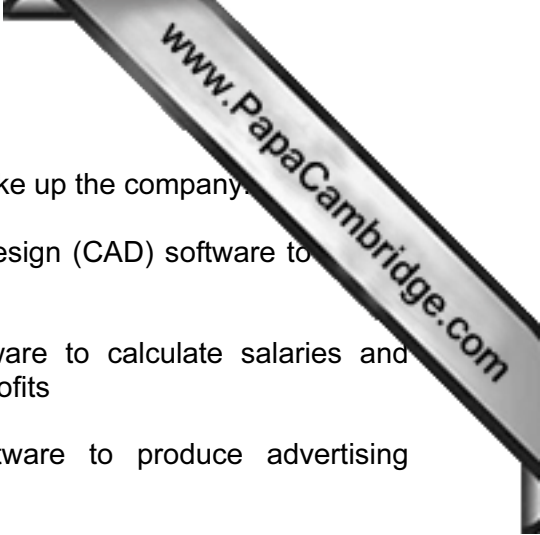
....

....

....

....

.... [2]

(ii) Explain how the user's answer to the puzzle can be checked by the computer.

....

....

....

.... [2]

7   A company designs and sells furniture. Three different offices make up the company.

Drawing Office   -   Staff use Computer Aided Design (CAD) software to ~~~~ new furniture

Finance Office   -   Staff use spreadsheet software to calculate salaries and monitor furniture sales and profits

Publicity Office   -   Staff use presentation software to produce advertising material

For **each** type of software, describe **one** feature which makes it suitable for the above applications.

Name **one** input device and **one** output device that could be used with each type of software. Justify your choice in **each** case.

Computer Aided Design (CAD) software

feature ....

....

input device ....

justification ....

....

output device ....

justification ....

.... [3]

Spreadsheet software

feature ....

....

input device ....

justification ....

....

output device ....

justification ....

.... [3]
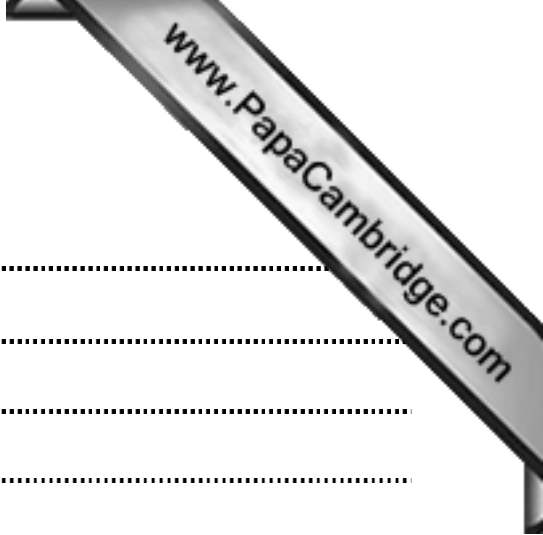
Presentation software

feature ....

....

input device ....

justification ....

....

output device ....

justification ....

.... [3]

[Turn over

8 A car has an engine management system (EMS). The EMS outputs the following sig

signal	value	description
A	0	temperature within limits
	1	temperature too high (fault condition)
B	0	pressure within limits
	1	pressure too high (fault condition)
C	0	carbon emissions within limits
	1	carbon emissions too high (fault condition)

(a) (i) Draw a logic circuit for the following fault condition:

All three signals (A = 1, B = 1 and C = 1) indicate a fault. The driver is warned to stop the engine – output X = 1.

A

B ———————X

C
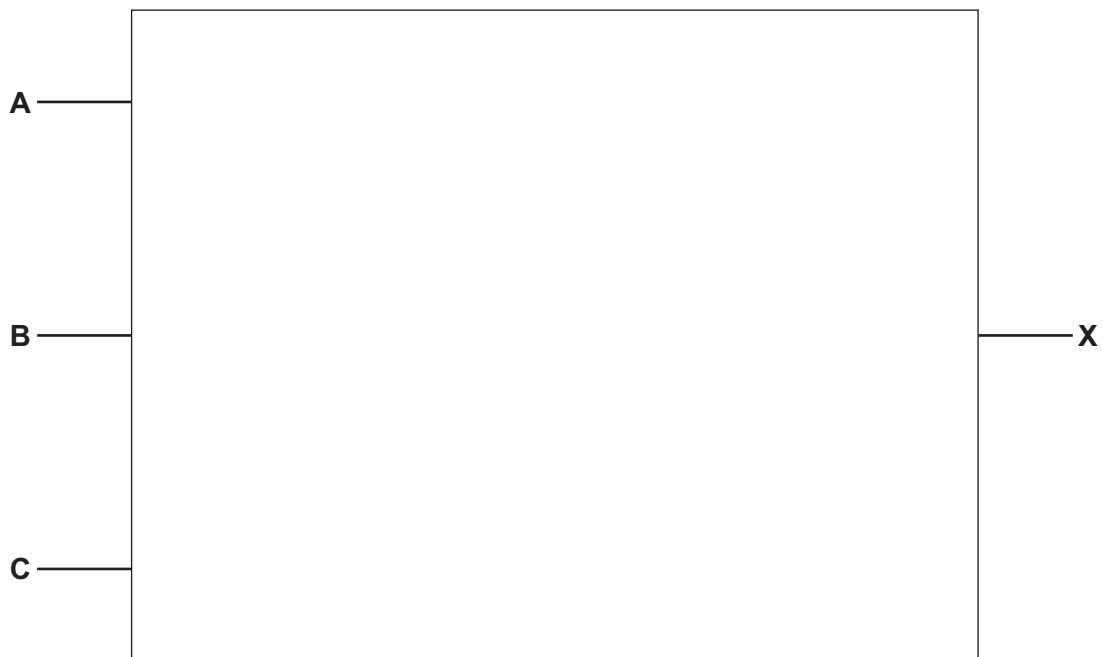
[2]

(ii) Draw a logic circuit for the fault condition:

Either (A = 1 and B = 1) or (B = 1 and C = 1) indicate a fault. The driver is warn[ed]
the engine needs a service – output Y = 1.

A ———

B ——— Y

C ———
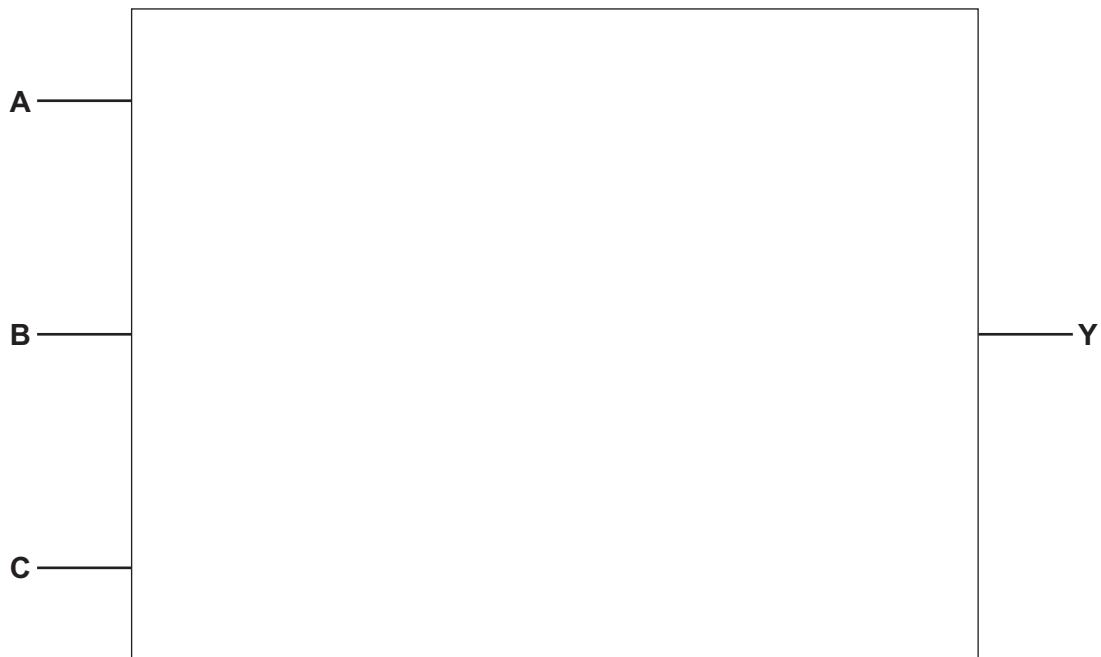
[2]

(iii) Draw a logic circuit for the fault condition:

Either A = 1 or B = 1 or C = 1 indicate a fault. A red warning light shows up on the
dashboard – output Z = 1.

A ———

B ——— Z

C ———
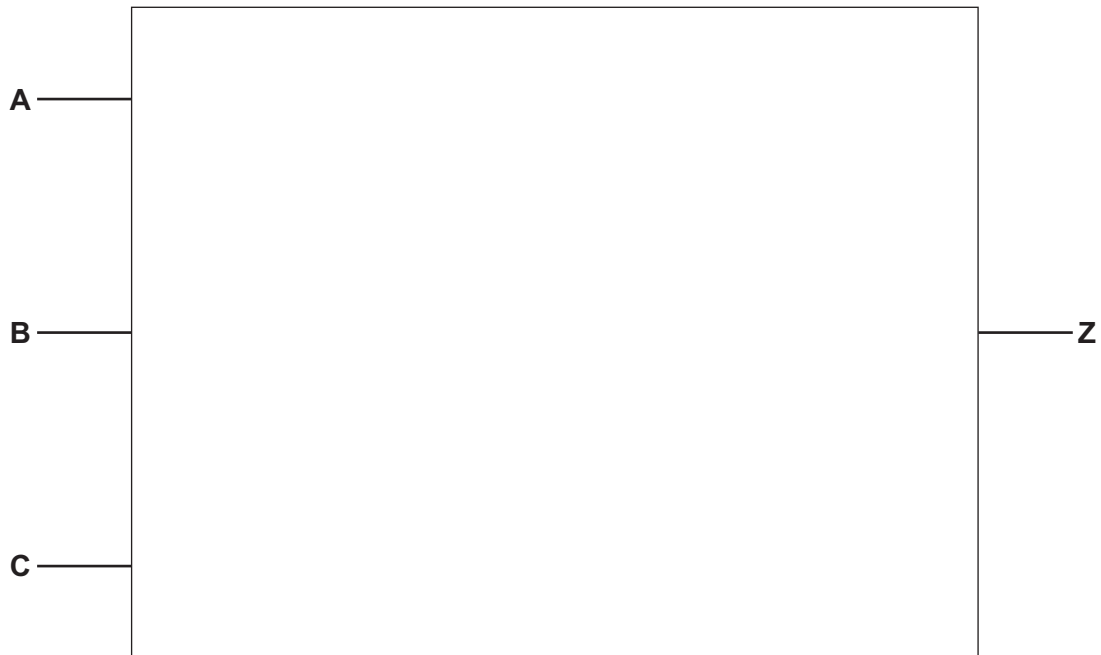
[2]

Question 8(b) continues on page 17.

(b) Complete the truth table for the three fault conditions:

A	B	C	working	X	Y	Z
0	0	0				
0	0	1				
0	1	0				
0	1	1				
1	0	0				
1	0	1				
1	1	0				
1	1	1				

[6]

[Turn over

9 A vending machine dispenses drinks and has a number of drinks options.

drink	option with code							
tea	black	10	+ milk	11	+ sugar	12	+ milk + sugar	1
coffee	black	20	+ milk	21	+ sugar	22	+ milk + sugar	23
cappuccino	normal	30	+ extra milk	31	+ sugar	32	+ extra milk + sugar	33
chocolate	normal	40	+ extra milk	41	+ sugar	42	+ extra milk + sugar	43
cold drinks	coke	50	orange	51	lemon	52	mango	53
water	normal	60	cold	61	cold fizzy	62	hot	63

The vending machine is controlled by a microprocessor.

If a customer keys in **23** then they will receive a cup of coffee with milk and sugar.

A selected code is stored in a 7-bit register:

So, 23 will be stored as

0	0	1	0	1	1	1

If an invalid code is keyed in, an error message is displayed.

(a) A customer selects a **lemon** drink.
Show how the code for this selection is stored in the 7-bit register:

[1]

(b) Name the drink selected if the register contains:

0	1	0	1	0	1	1

.... [1]

(c) State what would happen if the customer keys in a code which results in the following 7-bit register content:

1	0	1	1	0	1	1

....

....

.... [1]

(d) This system uses even parity. An extra eighth (8th) bit is used as the parity bit.
Give the parity bit values in parts (b) and (c) needed to achieve even parity.

Parity bit value in part (b): ☐

Parity bit value in part (c): ☐

[2]

(e) The vending machine is connected to a central computer through a dedicated communications line.

Every selection is stored. When eight drinks have been dispensed, these eight codes are transmitted to the computer.

(i) The communication line uses **parallel transmission**.
State what is meant by this term.

....

.... [1]

(ii) The vending machine transmits eight codes (bytes), followed by a parity byte. The following bytes have been received by the computer:

```
1 0 0 0 1 0 1 1
1 0 0 0 1 1 0 1
0 0 1 1 0 1 0 1
0 0 0 1 0 1 1 1
0 1 0 0 1 0 0 0
1 0 1 0 1 0 1 0
0 0 1 1 1 0 1 1
1 0 1 0 0 0 0 0
---------------------
0 1 0 1 0 1 0 1  ←— parity byte
---------------------
```

One of the eight bytes of data contains an error that occurred during data transmission.

Using an arrow, identify the byte where the error has occurred.
Circle the bit that has been altered.

Explain your reason for choosing the byte and bit identified above.

....

....

....

....

....

.... [3]

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