MONTFORT SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2019

Secondary 4 Express

COMPUTING	7155/01
Paper 1 Written	**18 Sep 2019 (Wed)**
11.00 am	**2 hours**

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

Write your name, index number and class in the spaces provided at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Approved calculators are allowed.

Answer **all** questions.

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.
You should show all your working.
The total marks for this paper is 80.

For Examiner's Use	
Total	80

This document consists of **13** printed pages and **1** blank page.

Setter: Mr Ricky Tan

1 John bought the latest computer with a loan of $3,000. The loan is to be repaid over 4 years. The interest rate is 5% per year and he has a spreadsheet to keep track of the repayments and the amount he owes.

	A	B	C	D	E	F	G
1	Initial Loan	$3,000		Principal paid to date			-$227.77
2	Interest	5%		Interest paid to date			-$48.58
3	Loan Length (months)	48		Number of payments made			4
4	Monthly Payment	-$69.09					
5	Total to Pay	-$3,662.69					
6							
7	Installment	Date	Payment	Principal	Interest		
8	1	1-Jan-19	-$69.09	-$56.59	-$12.50		
9	2	1-Feb-19	-$69.09	-$56.82	-$12.26		
10	3	1-Mar-19	-$69.09	-$57.06	-$12.03		
11	4	1-Apr-19	-$69.09	-$57.30	-$11.79		

(a) State the type of data that is held in each of the following cells.

A1...

B1...

B2...   [3]

(b) **(i)** The cell C8 shows the monthly payment amount.

Identify the most appropriate function to use in cell C8, if the interest rate and monthly payment amount remain the same.

…..   [1]

(ii) The cell G1 shows the total principal payment made to date.

Identify the most appropriate function to use in cell G1. The payments are entered in cells C8 to E11.

…..   [1]

(iii) The cell G3 shows the total number of payments made.

Identify the most appropriate function to use in cell G3. The payments are entered in cells C8 to E11.

…..   [1]

2 (a) (i) Convert the denary number **155** into a binary number. Show your working.

....

....

....

....

.... [2]

(ii) Convert the binary number **10111110** into a hexadecimal number. Show your working.

....

....

....

....

.... [2]

(iii) Convert the hexadecimal number **CD** into a denary number. Show your working.

....

....

....

....

.... [2]

(b) State and explain the ideal manner for memory dumps to be represented.

....

....

.... [2]

3 Integers are input into the flowchart below.

```
                              ┌─────────────┐
                              │   START     │
                              └─────────────┘
                                     │
                                     ▼
                              ┌─────────────┐        ┌─────────────┐
                              │ GrpA = []   │        │  Append X   │
                              │ GrpB = []   │        │  to GrpB    │
                              └─────────────┘        └─────────────┘
                                     │                      ▲
                                     ▼                      │
                              ╱───────────╱                 │
                             ╱  INPUT X  ╱                  │
                            ╱───────────╱                   │
                                     │                      │
      ╱───────────╱                  ▼                      │
     ╱  OUTPUT   ╱  Yes    ◇─────────────────◇             │
    ╱   GrpA    ╱ ◄──────── ◇   Is X = 0 ?   ◇             │
   ╱───────────╱            ◇─────────────────◇             │
         │                           │ No                   │
         ▼                           ▼                      │
   ╱───────────╱            ◇─────────────────◇  Yes        │
  ╱  OUTPUT   ╱             ◇   Is X = 1 ?   ◇ ────────────►
 ╱   GrpB    ╱              ◇─────────────────◇
╱───────────╱                        │ No
         │                           ▼
         ▼                  ┌─────────────────┐
   ┌───────────┐            │ Count = X - 1   │
   │   END     │            └─────────────────┘
   └───────────┘                     │
                                     ▼
   ┌───────────┐            ◇─────────────────────◇
   │ Append X  │   Yes      ◇  Is Count = 1 ?     ◇
   │ to GrpA   │ ◄───────── ◇─────────────────────◇
   └───────────┘                     │ No
                                     ▼
                            ┌─────────────────────┐
                            │ Check = X MOD Count │
                            └─────────────────────┘
                                     │
                                     ▼
                   Yes      ◇─────────────────────◇
              ◄──────────── ◇  Is Check = 0 ?     ◇
                            ◇─────────────────────◇
                                     │ No
                                     ▼
                            ┌─────────────────────┐
                            │ Count = Count - 1   │
                            └─────────────────────┘
```
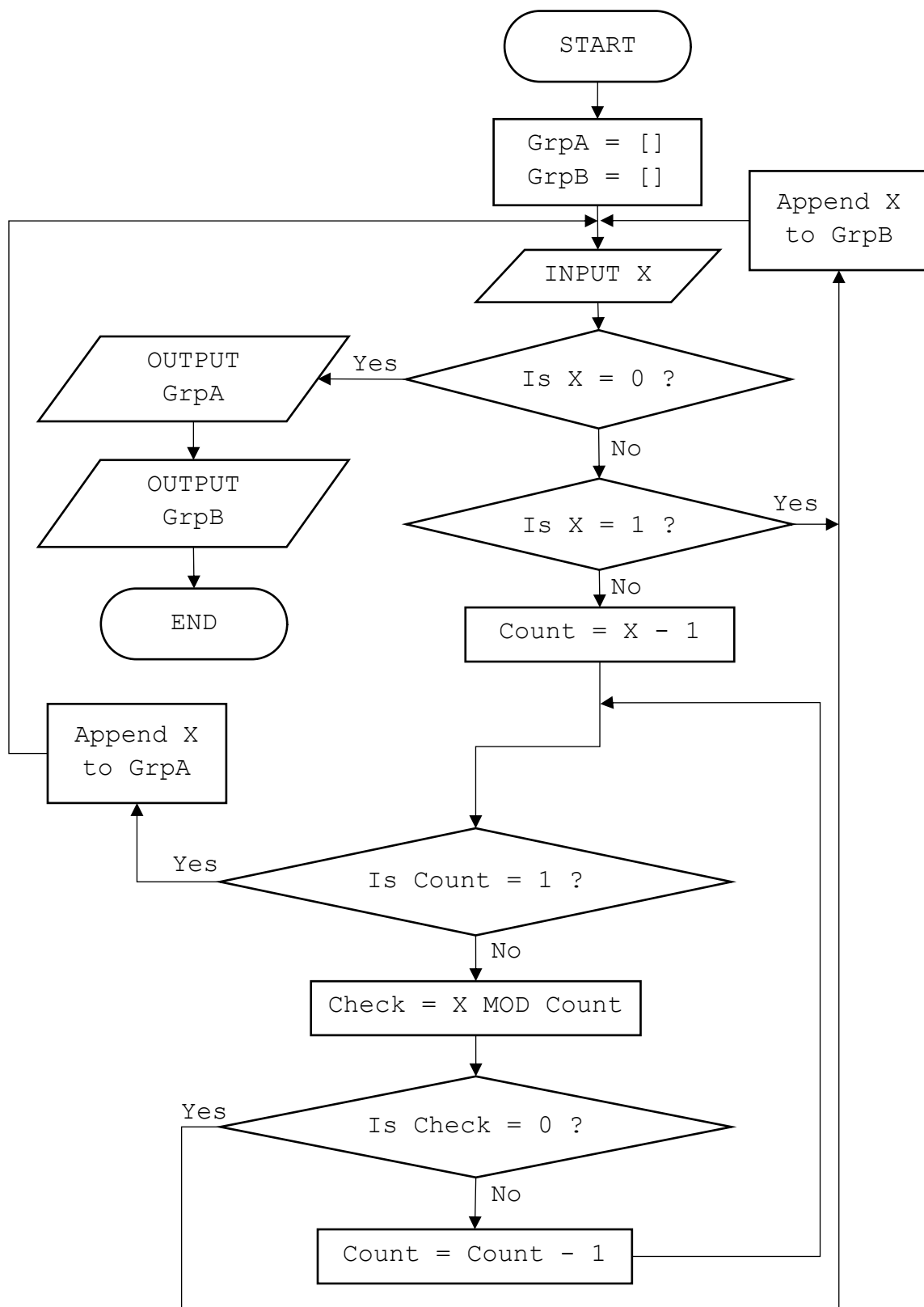
(a) Complete the trace table for the following set of data.

2, 3, 4, 5, 6, 7, 8, 0

Trace table

GrpA	GrpB	X	Count	Check	Output

[6]

(b) State the purpose of the algorithm.

…..

…..   [2]

4   The following diagram shows five network terms and six descriptions.

Draw a line between the term and the correct description.

Term	Description

Term

Description

| Ethernet |

| A device responsible for modulation and demodulation. |

| Media Access Control (MAC) |

| A device that forwards packets between separate networks. |

| The most commonly used wired network protocol for local and metropolitan are networks. |

| Router |

| A device that provides connection between wireless devices up to 100 metres away and can connect to wired networks. |

| Wireless access point (WAP) |

| Sequence of bytes that is used to identify a computer or device on the internet. |

| Internet Protocol (IP) |

| Sequence of bytes (usually permanent in nature) that is used to identify a particular network interface card. |

[5]

5 Insert **five** of the following words/phrases about data flow in the correct place in the text below.

fixed   iteration   procedural

repeating   selection   sequence

Flowcharts obey certain rules. The …………………..….. construct is for

…………………..….. instructions while a particular condition is true. The

construct for choosing between two or more branches based on a particular

condition is called the …………………..….. construct. The …………………..…..

construct is used to perform multiple instructions in a …………………..….. order.   [5]

6 The processor is usually a complex circuit made of many components that are compressed into a square or rectangular package.

(a) State the purpose of the Arithmetic Logic Unit (ALU).

……...

……...

……...   [1]

(b) State the purpose of the Control Unit (CU).

……...

……...

……...   [1]

(c) Describe what a "multi-core" processor is and explain its purpose.

……...

……...

……...

……...   [2]

7 Technology brings about social and economic impact on various areas of life, as well as related ethical issues.

(a) State the **positive** and **negative** social impacts of technology in Communication.

positive...

…..

…..

negative...

…..

….. [2]

(b) State **two positive** economic impacts of technology in Transportation.

1..

…..

2..

….. [2]

(c) Describe two ethical issues related to the impact of technology in Healthcare.

1..

…..

…..

2..

…..

….. [2]

8 **(a)** Identify the logic gates represented by the following truth tables.

(i)

A	B	X
0	0	1
0	1	0
1	0	0
1	1	0

.... [1]

(ii)

A	B	X
0	0	0
0	1	0
1	0	0
1	1	1

.... [1]

(b) A washing machine beeps when certain conditions occur during operation. The output, X, of a logic circuit that drives the alarm must have a value of 1 when one of the following occurs:

- washing is completed and the cover is closed
- load imbalance is detected and the cover is closed
- washing is in process and the cover is open.

The inputs to the system are:

Input	Binary	Condition
A	0	Washing is in progress
	1	Washing is completed
B	0	Load is balanced
	1	Load imbalance detected
C	0	The cover is open
	1	The cover is closed

(i) Write the Boolean statement for X.

....

.... [3]

(ii) Complete the truth table for X.

A	B	C	Working Space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

(iii) Draw the logic circuit to represent X.

A —

B — — X

C —
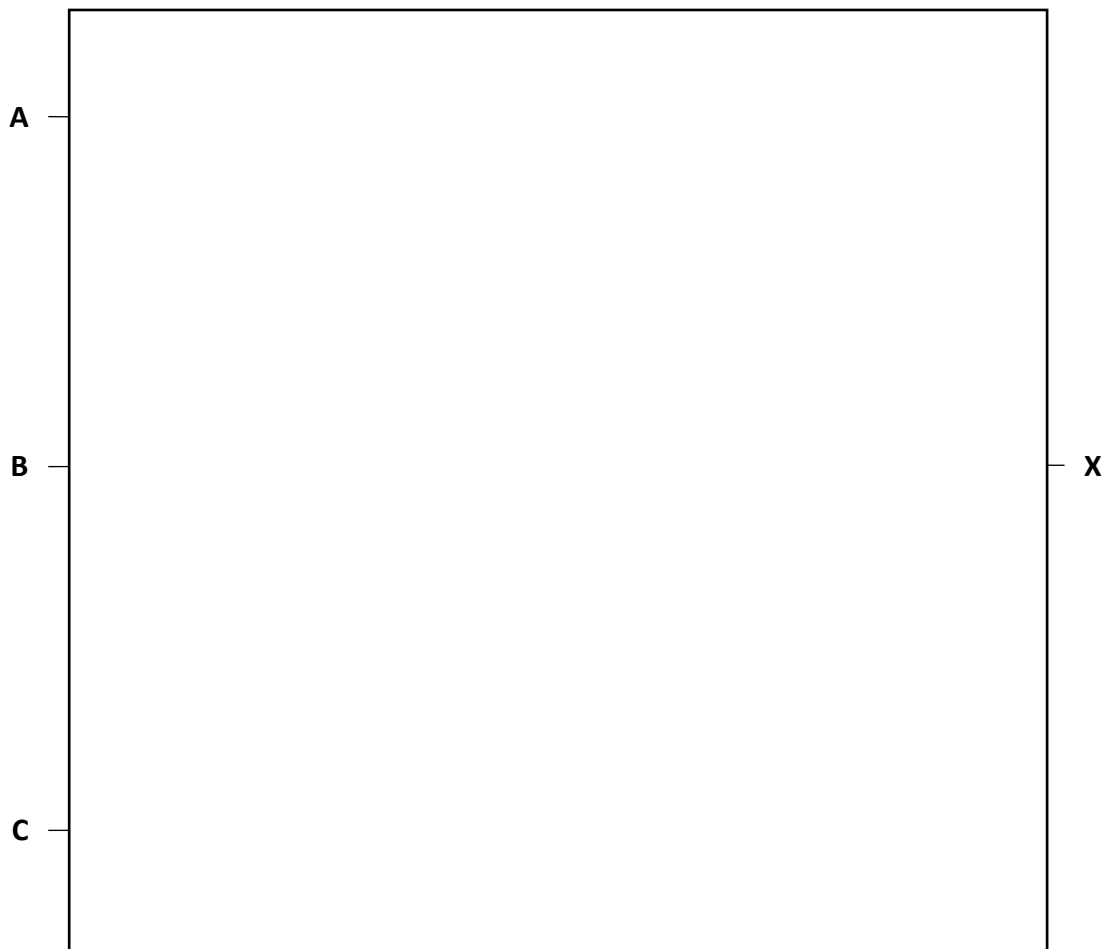
[4]

9 The diagram below shows five bytes received over a network where parity check is used.

| 10010001 | 00001010 | 10011000 | 10011000 | 11011110 |

(a) Given that two of the five bytes suffered a 1-bit transmission error, determine the parity system used.

…... [1]

(b) List the two bytes that suffered the 1-bit transmission error.

1..

2.. [2]

(c) Given the following information, state and explain whether the parity bit is prepended (added to the left) or appended (added to the right) to the binary data for transmission.
- The message sent was "HELLO".
- Characters are represented in ASCII.
- In ASCII, 'A' is represented by the number 65 (in denary).

…...

…...

…...

…...

…...

…... [4]

(d) State and briefly describe another basic error-checking method for data transmission.

…...

…...

…...

…... [2]

10 A pseudo-code algorithm:

- allows a user to repeatedly enter a number until 0 is entered
- outputs the largest number entered if it exists
- outputs the second largest number entered if it exists
- outputs the third largest number entered if it exists
- duplicates are allowed in the outputs.

```
1    Flag = [False, False, False]
2    Large = [0, 0, 0]
3    INPUT Num
4    WHILE Num is not equal to FALSE
5        FOR Count = 0 to 2
6            IF Num > Large[Count] THEN
7                Temp = Large[Count]
8                Large[Count] = Num
9                Num = Temp
10               Flag[Num] = TRUE
11           ENDIF
12       NEXT Count
13       INPUT Num
14   ENDWHILE
15
16   FOR Count = 0 to 2
17       IF Flag[Count] == FALSE THEN
18           OUTPUT Flag[Count]
19       ENDIF
20   NEXT Count
```

There are **four** errors in this pseudo-code. Locate the errors by writing the line number and state the correct pseudo-code.

Error 1..

Correction..

Error 2..

Correction..

Error 3..

Correction..

Error 4..

Correction.. [8]

11 Write an algorithm, using only pseudo-code or a program flowchart that:
- inputs two positive integers one after another
- outputs the highest common factor (HCF) of the two numbers. The HCF is the largest integer that divides both numbers without leaving a remainder. For example, the HCF of 252 and 105 is 21.

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.... [8]

End of Paper