Name:	Class	Index Number

Jurong West Secondary School

Preliminary Examinations 2018

80

COMPUTING **7155/01**

Secondary Four Express **27 August 2018**

Paper 1 **0800 – 1000**

2 hours

Candidates answer on the Question Paper.

No Additional Materials are required.

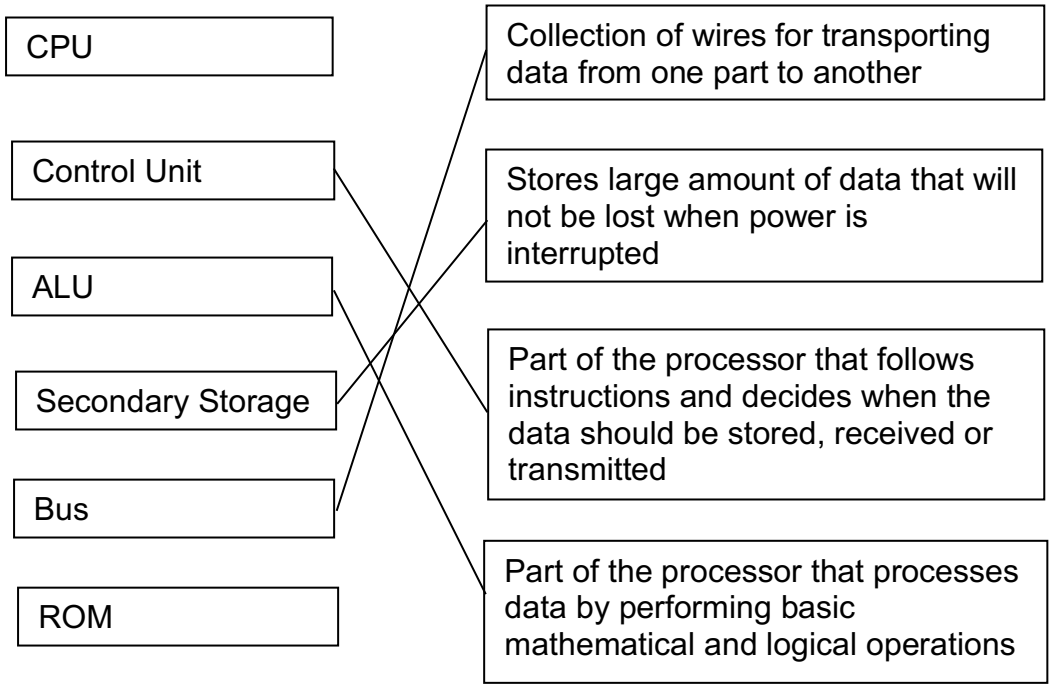
MARKING SCHEME

This document consists of **14** printed pages.

Setter: Mr V Surya

Answer all questions

1 Draw a line to match the computer parts to the correct description.



[4]

2 Cloud services allow users to run programs and access data anywhere over the Internet without having to be at a particular physical location.

Describe two safety measures you can take to prevent unauthorised access to your private information when using cloud services.

Safety Measures:

- Read and fully understand the privacy policy of the cloud service.
- Do not store secret or confidential information on cloud services.
- Ensure that the traffic between your device and the cloud service is encrypted before using the cloud service.
- Constantly change your cloud passwords

[2]

3 Insert five of the following words about network devices and components, in the correct place in the text below.

client	network hub	router	SSID
modem	server	network bridge	port

The ……port…… number is used together with an IP address to uniquely identify a program that is running on a network.
The ……network hub…… is a device that connects multiple devices to the same network and transmits received packets to all connected devices.
The ……modem…… is a device that converts digital signals to analog signals and vice-versa.
The ……SSID…… is a 32-bit string that identifies a wireless access point and all devices connected to it.
The ……router…… is a device that forwards packets between separate networks. [5]

4 When we use a programming language, the source code must be translated into machine code before it can be run.

Identify two ways by which source code can be translated into machine code and state an advantage of each method.

Method 1 ……Using an Interpreter…….

Advantage …… - Changes to the source code take effect immediately.
- Interpreters usually offer an interactive mode, which facilitates learning and experimentation.

Method 2 ……Using a Compiler……..

Advantage …….. - The resulting program runs at a faster speed because all the translation has been done beforehand.
- The compiler is not needed to run the program after compilation [4]

5 A meteorologist wants to find out the day and mean temperature recorded, for the hottest day in the month of January, which contains 31 days.

State the inputs and outputs required for this problem.

Inputs day_list: list containing all the days of the month
temperature_list: list of mean temperatures for each day of the month
……

Outputs day of the month
hottest mean temperature recorded
……

Identify two examples of inputs where it may not be possible to find the hottest day in the month of January.

Example 1 If the lists are *empty*, there will be no output .
……

Example 2 If there are two or more days with identical temperatures and deemed to be the hottest, there will be an erroneous output .
…… [6]

6 Sequence data types allow you to store multiple values in an ordered, organised and efficient fashion.

(a) State two sequence data types in Python.

(i) String (str) ……
(ii) List (list) …… [2]

(b) State two non-sequence data types in Python.

(i) Integer (int)/ Float (float) ……
(ii) Boolean (bool) …… [2]

7 Data can be corrupted due to a number of reasons.

(a) Describe how the following causes can contribute to data corruption and provide a preventive measure for each cause.

(i) Human error

When multiple users write to the same file at the same time.

Preventive Measure:
- Make regular backups of data
- Use adequate protection when transporting storage devices
- Set up rules when collaborating with multiple users

[2]

(ii) Power failure

If power supply fails when data is being written to storage device.

Preventive Measure:
- Make regular backups of data
- Setup backup power supply (Uninterruptible power supply – UPS)

[2]

(b) To ensure integrity of data during network transmission, parity checks are commonly used for error-checking.

(i) The word “be” was sent across the internet. Assuming an odd parity system was used, state if there were any errors in the transmission for each character.

ASCII character	**Data received at destination**	**Was there an error?**
b	01100010	NO
e	01100101	YES

[2]

(ii) - For instance, it is able to detect that an error has occurred but cannot determine where the error occurred.
- If there is a case where more than 1 bit has changed, it will result in correct parity even though the data is actually corrupted

[1]

8 A topology describes the physical layout of a network. Understanding the topology is essential to designing a network.

(a) State three common types of network topology.

Bus, Ring, Star

…… [3]

(b) A businessman intends to set up a company in town. He wants to have a secure LAN in the office. He has about 140 staff working in the same office while another 20 staff working from offsite locations. The staff need to share files and be able to connect to printers. He also plans to expand his business in the next five years.

(i) Which network topology is most suitable in this case? Why?

Choice Star Topology

Reason ……

If a fault occurs at a computer or cable, it is easy to isolate the fault and do a replacement without affecting the rest of the network. [2]

(ii) State two advantages of a client-server network over a P2P network.

Advantage 1 If a P2P network were to be used, the bandwidth of the network could decrease if the number of computers were to increase.

Advantage 2 ……

A client-server network is best for implementing a secure system where users are required to authenticate to a network, while a P2P network offers little to no security. [2]

9 In order to locate or identify a particular component on a network, an IP (Internet Protocol) address is used along with a MAC (Media Access Control) address.

(a) State the difference in operation between an IP address and a MAC address.

As the IP may change each time it connects to the Internet, it is not considered permanent. Media Access Control (MAC) is the hardware address and is more permanent. In some ways, an IP address is like a mailing address while a MAC address is like a thumbprint. [B2]

[2]

(b) The following is a valid IPv4 denary address.

12.97.19.155

Convert the IPv4 denary address into a 32-bit binary address.

00001100. 01100001. 00010011. 10011011 [2]

(c) The following is a valid MAC hexadecimal address.

20:17:0B:AD:C0:DE

(i) Identify the number of bits represented by the MAC address.

48 bits [1]

(ii) Convert the MAC address to a binary address.

0010 0000: 0001 0111: 0000 1011:
1010 1101: 1100 0000: 1101 1110 [2]

(iii) Briefly explain the benefit of using the hexadecimal representation of the MAC address compared to its binary representation.

Hexadecimal is more compact compared to binary as hexadecimal system represents each byte with two characters [1]

10 An algorithm is required to find the highest and lowest numbers based on 100 positive inputs provided by the user. Study the following pseudo-code.

```
highest = 0
lowest = 0
Counter = 1
WHILE Counter < 100
    INPUT Number
    IF Number < highest
        highest = Number
    ENDIF
    IF Number < lowest
        Number = lowest
    ENDIF
    Counter = Counter + 1
ENDWHILE
OUTPUT highest, lowest
```

There are four errors in this pseudo-code. Locate the errors and state the correct pseudo-code.

Error 1 ..... lowest = 0 .....

Correction ..... lowest = 9999 .....

.....

Error 2 ..... WHILE Counter < 100 .....

Correction ..... WHILE Counter < 101 / WHILE Counter <=100 .....

.....

Error 3 ..... IF Number < highest .....

Correction ..... IF Number > highest .....

.....

Error 4 ..... Number = lowest .....

Correction ..... lowest = Number .....

..... [8]

11 (a) Identify the logic gate represented by the following truth table.

Inputs		Output
X	**Y**	**Q**
0	0	0
0	1	1
1	0	1
1	1	1

OR Gate ..... [1]

(b) The following truth table is linked to a three-input logic circuit.

The output is represented by the letter **X**.

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

State the Boolean statement associated with the truth table.

X = (NOT A and NOT B and NOT C) 1 mark for each line ..... [3]
or (NOT A and NOT B and C)
or (A and B and C)

(c) A nuclear power plant has a safety system, that is controlled by a three-input logic circuit made up of **AND**, **OR** and **NOT** gates only. A **WARNING** signal (S = 1) is produced based on certain conditions, shown in the table below.

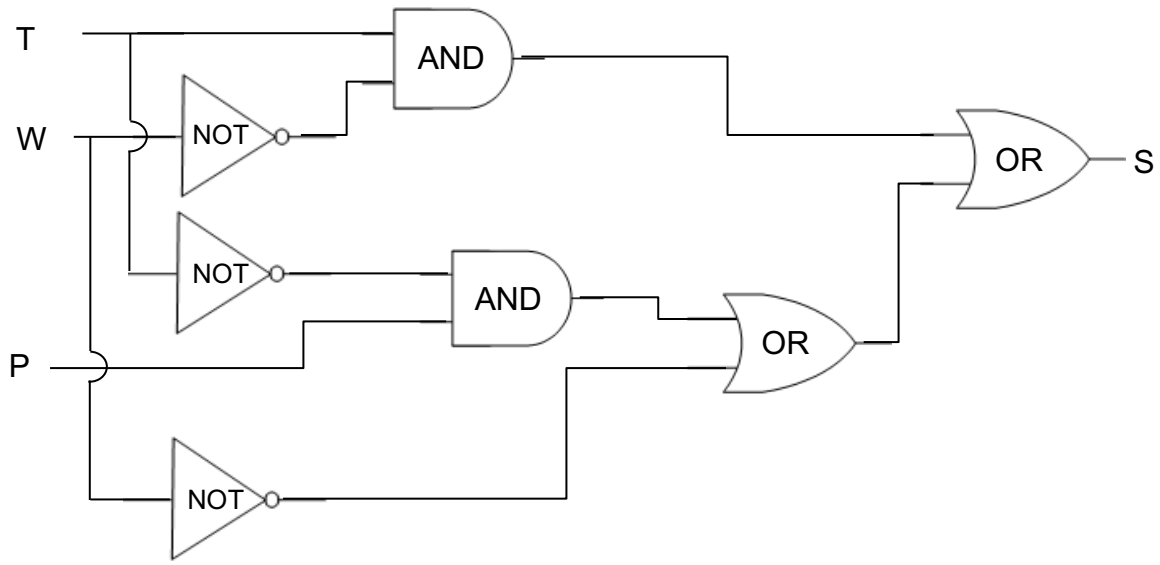
Input	Binary	Condition
T	0	Temperature ≤ 115°C
	1	Temperature > 115°C
P	0	Reactor pressure ≤ 15 bar
	1	Reactor pressure > 15 bar
W	0	Cooling water ≤ 120 litres/hour
	1	Cooling water > 120 litres/hour

A **WARNING** signal (S = 1) occurs only when:

either Temperature, T > 115°C and Cooling water, W ≤ 120 litres/hour

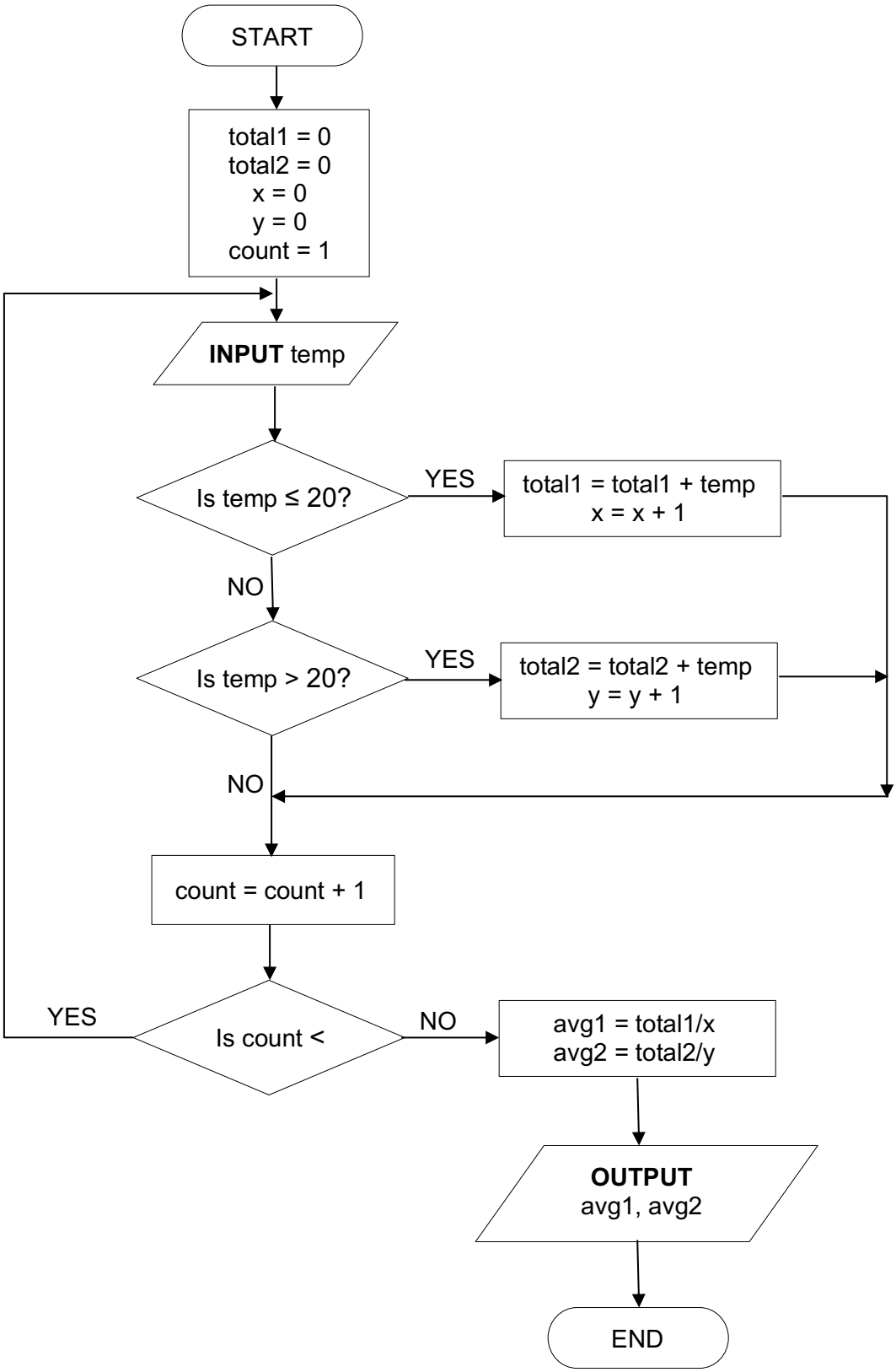
or Temperature, T ≤ 115°C and Reactor pressure, P > 15 bar or Cooling water ≤ 120 litres/hour

Draw the logic circuit for the system.



[7]

12 Study the following flowchart and answer the questions that follow.



Draw the trace tables for the following test data

24, 16, 31, 20, 28, 21, 18, 16, 25, 25

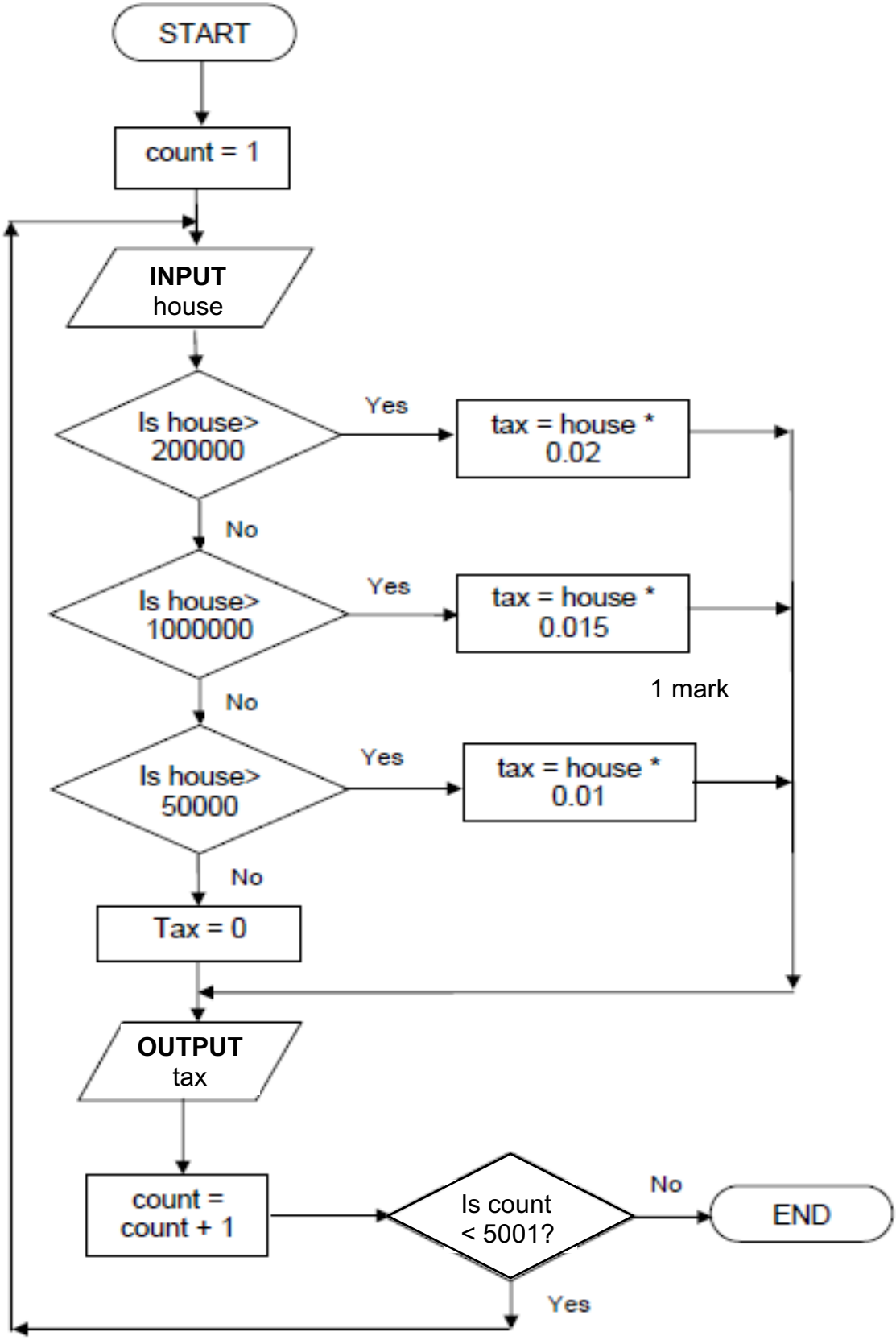
total1	total2	x	y	count	temp	avg1	avg2	OUTPUT
0	0	0	0	1	24			
	24		1	2	16			
16		1		3	31			
	55		2	4	20			
36		2		5	28			
	83		3	6	21			
	104		4	7	18			
54		3		8	16			
70		4		9	25			
	129		5	10	25			
	154		6	11		17.5	25.7	17.5, 25.7

[7]

13 Write an algorithm using only pseudo-code or a program flowchart that:

- Inputs the value of 5000 houses in a town, one at a time,
- Calculates and outputs the tax amount each houseowner must pay, based on the value of the house:
    - Houses valued over $200 000 pay 2% of their value in tax;
    - Houses valued over $100 000 pay 1.5% of their value in tax;
    - Houses valued over $50 000 pay 1% of their value in tax;
    - Houses valued $50 000 and below pay 0% of their value in tax.

Flowchart Solution:



1 mark

Pseudo-code Solution:

```
FOR count = 1 to 5000
   INPUT house    1 mark
   IF house > 200 000    1 mark
        then tax = house * 0.02
   ELSE IF house > 100 000
        then tax = house * 0.015
   ELSE IF house > 50 000
        then tax = house * 0.01
   ELSE
        tax = 0
   ENDIF
   OUPUT tax
NEXT
```

[7]

End Of Paper