UTM

UNIVERSITI TEKNOLOGI MALAYSIA

UNIVERSITI TEKNOLOGI MALAYSIA (UTM)

PROGRAMMING TECHNIQUE – 1 (03)

ASSIGNMENT 3

Prepared by:

NAME	MATRIC ID
HASSAN MUSTAFA IBRAHIM	A20EC4025
MUHAMMAD IMRAN HAKIMI BIN MOHD SHUKRI	A20EC0213
MOHAMED TAREK ELSAYED MOHAMED YOUSEF MOHAMED TORKY	A20EC0275

1. There are five operators shown in the expression as in the given figure. Label the order of execution for each operator in the boxes as stated in the expression. The operator that will be executed first should be labeled as 1, the second operator to be executed should be labeled as 2, and so on. Finally give the result of the expression according to this sequence of executions.

[3 marks]

z	=	(	12	+	4	)	/	4	+	30	/	3	-	3
				1			2		4		3		5	

Answer: 11

2. What is the output for the following statements marked (a) to (e). Write your answer in the space provided according to the sequence required.

[5 marks]

```
double val = 10.34567;

cout << setprecision(6) << val  << endl;                  // (a)
cout << static_cast<int>(val)/2  << endl;                 // (b)
cout << "\t" << setprecision(3) << val << ", " ;          // (c)
cout << setw(6) << val*5 << endl  << endl;                // (d)
cout << showpoint << fixed << setw(9) << val << endl;     //  (e)
```

Answer:

(a) 10.3457
(b) 5
(c,d) 10.3, 51.7
(e) 10.346

3. Refer to **Program A.1** below which is incomplete. As a result of the prompt on line **9**, assume that the input string entered is "ABCDEFG HIJKL". Write the corresponding output to be displayed for each of the corresponding codes in Code 1, Code 2 and Code 3 as given in the boxes after **Program 1**.

[7 marks]

```
 1  // Program 1
 2  #include <iostream>
 3  #include <iomanip>
 4  using namespace  std;
 5
 6  int main( )
 7  {
 8     char   x[13];
 9     cout << " Enter a string :  ";
10
11     // either Code 1, 2 or 3
12     // will be placed here
13
14  return 0;
15  }
```

Code 1: [2 marks]

```
cin>>x;
cout<<x<<endl;
```

Output:

A	B	C	D	E	F	G						

Code 2: [2 marks]

```
cin.getline(x,13);
cout<<x<<endl;
```

Output:

A	B	C	D	E	F	G		H	I	J	K	

Code 3: [3 marks]

```
cin>>x;
cout<<setw(13)<<x<<endl;
```

Output:

					A	B	C	D	E	F	G	

4. The following C++ program, **`Program 2`** cannot be compiled. Rearrange the lines in the correct sequence in order for the program to be compiled and executed to produce the output as indicated.

[5 marks]

```
 1  // Program 2
 2  cout << "Success\n";
 3  cout << " Success\n\n";
 4  int main()
 5  cout << "Success"; }
 6  using namespace std;
 7  #include <iostream>
 8  cout << "Success\n";
 9  {
10  return 0;
```

Program output :

```
Success
Success

Success Success
```

Use the table below to rearrange the lines based on the output given.

1	// Program 2
2	#include <iostream>
3	using namespace std;
4	int main()
5	{
6	cout << "Success\n";
7	cout << " Success\n\n";
8	cout << "Success";
9	cout << "Success\n";
10	return 0; }

5. Write the corresponding conditional expression for the following if else statements.

[12 marks]

	if…else statement	Conditional expression

i.	`if (score >= 50)`
	`{ numPass++;`
	`cout<<"Pass"; }`
	`else`
	`{ numFail++;`
	`cout<<"Please try again."; }`
		(score >=50) ? (numPass++ , cout << "Pass") : (numFail++, cout << "Please try ag ain");
		
		// if score is bigger than or equal to 50 the output will be pass
		// if not the output will be Please try again
		// ? = ternary operator will replace if else

ii.	`if (cpa >= 2.0)`
	`{ if (cpa >= 3.5)`
	`status = "Dean's List";`
	`else`
	`status = "Normal Pass"; }`
	`else`
	`{ if (cpa >= 1.7)`
	`status = "Probation";`
	`else`
	`status = "Fail"; }`
		(cpa>=2.0) ? ((cpa>=3.5) ? status="Dean's List" : status= "Normal List") : ((cpa>=1.7) ? status="Probation" : status="Fail");

6. Write C++ **`if`** statement code fragments to satisfy the given conditions.

[10 marks]

i.	Check the range of frequency, **`freq`** to be between 100Hz and 10000Hz. Display **`"Acceptable"`** if within the range and **`"Unacceptable"`** if not. (3 marks)

	int freq; //assign freq as an integer
	cout << "Enter a big number :- ";
	cin >> freq; //ask for input
	if (freq>100&&freq<10000) //&& used to assure that the two conditions must be true
	{
	cout << "Acceptable";
	
	}
	else
	
	{
	cout << "Unacceptable";
	}

ii.	Check the prerequisite for a soldier candidate to be of **`age`** between 18 to 30 years, **`weight`** between 50 to 65kg and **`height`** must be greater than 156m. Display **`"Fulfill requirements"`** or **`"Do not fulfill requirements"`** based on these conditions. (3 marks)

	`int age,weight,height;  //assign age,weight,and height as an integer`
	`cout << "Write the\nAge :- " ;`
	`cin>> age;`
	`cout << "Weight :- ";`
	`cin>> weight;`
	`cout << "Height :- ";`
	`cin >> height;`
	`if (age>18&&age<30&&weight>50&&weight<65&&height>156)  // if statement to check for condition`
	`{`
	`  cout << "Fulfill requirements";  // if the condition true the ouput will be this`
	`}`
	`  else`
	`  cout << "Do not fulfill requirements";  //and if it's false the output will be this`

iii.	Henry wants to buy a car. It must be under one of these conditions. Either: (a) The **`year`** made: after 2010, cylinder capability: **`cc`** between 1.5 to 2.0. ***or*** (b) The **`year`** made: before 2010 , cylinder capability: **`cc`** greater than 2.0. His decision either to **`"Purchase car"`** or **`"Do not purchase car"`** should be reflected in the code. (4 marks)

	`int year;`
	`double cc;`
	`cout << "Enter the\nYear :- ";`
	`cin >>year;`
	`cout << "CC :- ";`
	`cin>> cc;`
	`if (year>2010&&cc>1.5&&cc<2.0)  //check for the condition`
	`{`
	`  cout << "Purchase car";  //true`
	`}`
	`else if(year<2010&&cc>2.0)  //the other condition using else if`
	`{`
	`  cout << "Purchase car";  //true`
	`}`
	`else`
	`  cout << "Do not purchase car";`

8. What is the output for the following code excerpts?

[5 marks]

Code	**Output**

`int n = 0;`
`if (n = 0)` // it must be n==0 to be true
`  cout << "Yes";`
`else`
`  cout << "No";`
`}`
	No

`int i=10, j=3,k = 20;`
`cout << ((j < 4 )|| (j == 5) && (i <= k));`
// j is less than 4 so it will be 1 + (0*1) // boolen values (1 true/0 false)
	1

`int x = 13, y = 9;`
`if (x >= y)` // all conditions are true so 13*9 =117
`if (y > 0)`
`x = x * y;`
`else if (y < 4)`
`x = x - y;`
`cout << x;`
	117

9. Fill in the spaces provided in order for the program segment to produce the output as shown.

```
// Question 9.a. - [8 marks]
int x = _____15_____ ;                    //(a)
do {
   x--;
   if (x %_____2_____ == _____1_____ )   // (b) and (c)
      continue;
   cout << x << "  ";
} while (x >=_____5_____ );               // (d)
```

Output:

```
14  12  10  8  6  4
```

```
// Question 9.b. - [6 marks]
int y = 2;
do {
   if (y ___> 256_____)                        // (a)
      break;
   cout << y << "  ";
   y = _____y*y_____ ;                         // (b)
} while (y >= _____2_____ );                   // (c)
```

Output:

```
2  4  16  256
```

10. Based on the flowchart given in **Figure 1**, answer parts (i) to (iii) of this question.

[10 marks]

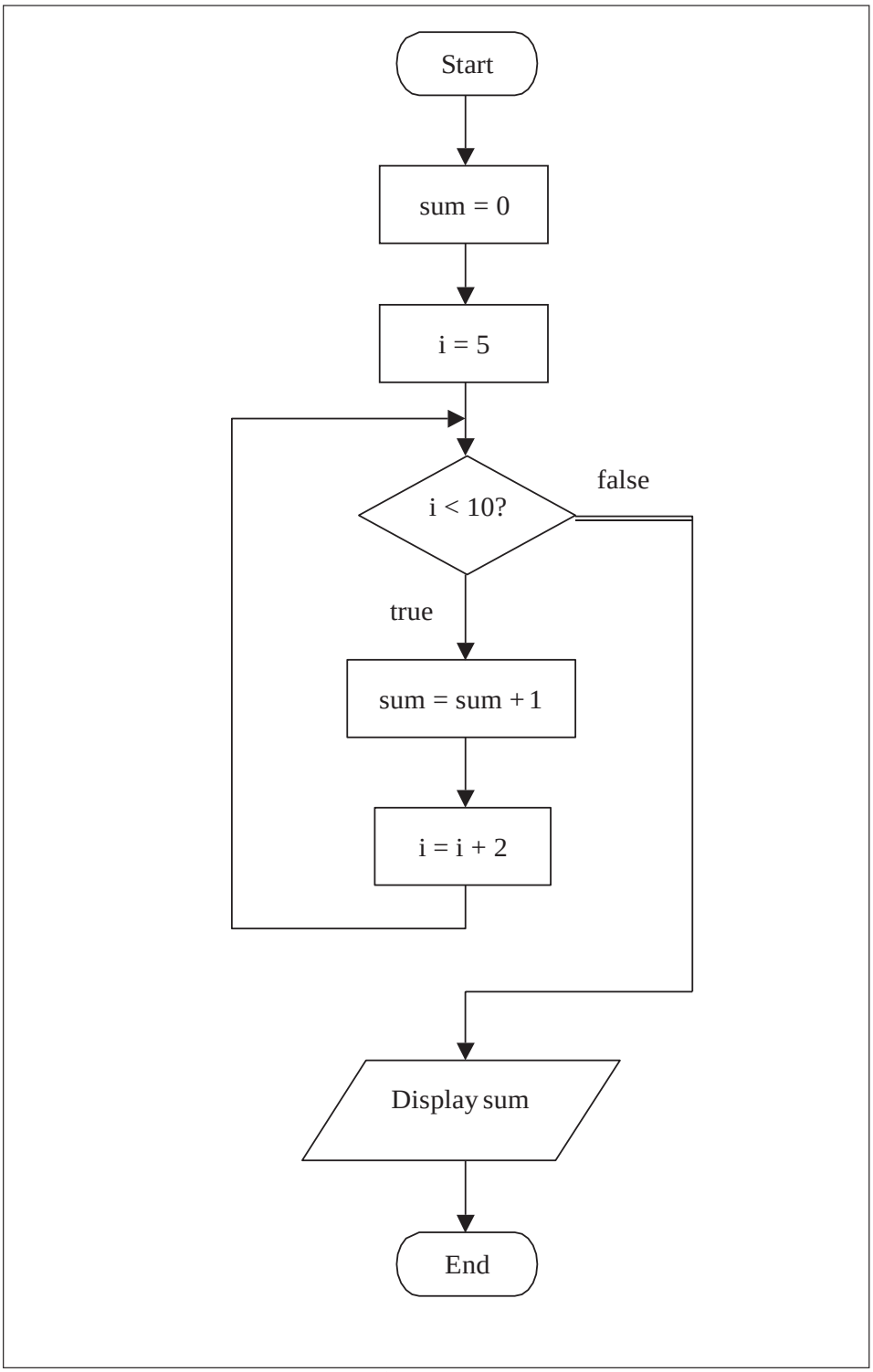

Figure 1

i. Convert the given flowchart into its equivalent C++ code excerpt. (4 marks)

```
int main(){
   int sum=0, i=5;
   while (i<10)
      {
       sum = sum + 1;
       i = i + 2;
      }

 cout << sum << endl;
 return 0;
      }
```

ii. How many times theloop repeat. (1 mark)

3 times

iii. Modify your code by using decrement counter loop without changing the variables involved and the number of loops involved. (4 marks)

```
int main(){
     int sum=0, i=5;

       while (i>=3)
     {
        sum = sum + 1;
        i--;
      }
   cout << sum << endl;

   return 0;
      }
```

11. **Program 3** is able to count the number of input character of **A**, **B** and **C**. The program will loop reading the input until the sentinel value **e** is being input. The sample output of the program is as shown:

[20 marks]

```
Enter the letter grades[Enter 'e'  character  to end input]
A
Enter the letter grades[Enter 'e'  character  to end input]
B
Enter the letter grades[Enter 'e'  character  to end input]
C
Enter the letter grades[Enter 'e'  character  to end input]
C
Enter the letter grades[Enter 'e'  character  to end input]
C
Enter the letter grades[Enter 'e'  character  to end input]
e

Totals for each letter grade are:
A: 1
B: 1
C: 3
Press any key to continue . . .
```

Complete **Program 3** based on the comments given

```
1   //Program 3
2   #include <iostream>
3   using namespace std;
4
5   int main()
6   {
7        char grade;      // one grade
8        int aCount = 0; // number of  characterAs
9        int bCount = 0; // number of  Bs
10       int cCount = 0; // number of  Cs
11
12  cout << "Enter the letter grades[Enter  'e' character  to end
13  input]"<< endl;
14  cin>>grade;
15
16  // loop: as long as sentinel value has not been achieved
17       while (grade != 'e')      {       // (a)          - 2 marks
18
19
```

```
//write appropriate statement for testing input  cases
switch(grade)      {           // (b)          - 2 marks
//in case of input A, increment  variable aCount       - 3 marks
case 'A' :                                  // (c)
         aCount++;                          // (d)
         break;                             // (e)
//in case of input B, increment  variable bCount       - 3 marks
case 'B' :                                  // (f)
         bCount++;                          // (g)
         break;                             // (h)
//in case of input C, increment  variable cCount       - 3 marks
case 'C' :                                  // (i)
         cCount++;                          // (j)
         break;                             // (k)
//add the statement to catch all other alphabets and prints
//"Incorrect letter  grade  entered."                  - 3 marks
default :                                                  // (l)
cout << "Incorrect letter grade entered." << endl;         // (m)
   break;                                                  // (n)
} // end test cases
//ask for another input  letter grades                 - 2 marks
cout << "Enter the letter grades[Enter 'e' character to end input]"<< endl;// (o)
          cin>>grade;                                        // (p)
} // end loop
// output summary  of results                          - 2 marks
cout << "A : " << aCount << endl; // (q) display number of A  grades
cout << "B : " << bCount << endl; // (r) display number of B  grades
cout << "C : " << cCount << endl; // (s) display number of C  grades
     return 0;
 } // end function main
```

12. Write a **`Program 4`** that allows user to:

(i) Input integer number(s) continuously until they decide to terminate/quit the program by entering '0' (zero).

(ii) Count how many times the user input any extreme values that are numbers, which **not in the range** of 30 to 200.

(iii) Calculate the average value for the user inputs.

Figure 2 shows the output sample for the case of extreme values are being input, while **Figure 3** shows the output sample for the case of no extreme values are being input.

```
Enter a number (0 to quit) : 201
Enter a number (0 to quit) : 205
Enter a number (0 to quit) : 29
Enter a number (0 to quit) : 25
Enter a number (0 to quit) : 0

Average is: 115.00
There were 4 extreme values
Press any key to continue . . .
```

Figure 2

```
Enter a number (0 to quit) : 30
Enter a number (0 to quit) : 200
Enter a number (0 to quit) : 40
Enter a number (0 to quit) : 0

Average is: 90.00
There were 0 extreme values
Press any key to continue . . .
```

Figure 3

Complete **`Program 4`** below based on the given instructions within the program.

[10 marks]

```
1   //Program 4
2   //Include suitable libraries @  header file                (2 marks)
3   #include <iostream>
4   #include <iomanip>

5   using namespace std;
6
7   #define LOW 30                  // lowest value in range
8   #define HIGH 200                // highest value in range
9   #define EXIT 0                  // sentinel value
10
11  int main()
12  {
13     int userVal;                 // user input
14     int extremeCnt = 0;          // extreme values counter
15     int sum = 0;                 // total values of user inputs
16     int num = 0;                 // no of user inputs
17     double avg;                  // average of user inputs
18
19  // Prompt user to input the first number
20     cout << "Enter a number ("<< 0 <<" to  quit):";
21     cin >> userVal;
22
```

```
23  /* Write WHILE loop that allow user  to:
24     - Input number(s) continuously until user enter  '0'
25     - Count no of user inputs and extreme values counter
26     - Calculate total value of user  inputs
27                                                    (4 marks)  */
28  while (userVal != EXIT) // will stop when user inter 0
29  {
30        if ((userVal < LOW) || (userVal > HIGH)) // will increment extremeCnt
    when user value is less than 30 or bigger than 200
31      {
32                        extremeCnt++;
33      }
34
35        num++;
          sum += userVal;
36
37        cout << "Enter a number ("<< 0 <<" to quit):"; // prompt the user to inter
    value
38        cin >> userVal;
39    }
40
41
42  /* Calculate the average value for the user  inputs
43     Display the number of  extreme values            (4 marks)  */
44
45  avg = static_cast<double>(sum) / num;
46    cout << fixed << showpoint << setprecision(2); // to show fractional part up to two plac
47    cout << "Average is : " << avg << endl;
48    cout << "There were " << extremeCnt << " extreme values" << endl;
49
50    return 0;
51
52  } //end main
```