UNIVERSITI TEKNOLOGI MALAYSIA

MID-TERM TEST (THEORY COMPONENT)

SEMESTER I 2017/2018

SUBJECT CODE	**: SCSJ1013**
SUBJECT NAME	**: PROGRAMMING TECHNIQUE I**
YEAR/COURSE	**: 1 (SCSJ / SCSV / SCSB / SCSR /SCSP)**
TIME	**: 1 HOUR 30 MINUTES (8.30 am – 10.00 am)**
DATE	**: 17 NOVEMBER 2017**
VENUE	**: N28, MPK1-MPK10**

INSTRUCTIONS TO THE STUDENTS:

This test book consists of 10 questions.

ANSWER ALL QUESTIONS IN THIS BOOKLET IN THE SPACES PROVIDED. Additional answer sheets will be given upon request.

Name	
I/C No.	
Year/Course	
Section	
Lecturer's Name	

This question booklet consists of **11 pages** inclusive of the cover page.

1. Determine the output for the program segment given in Table 1. Write your output with decimal points if applicable in **Output** column in Table 1. **(7 marks)**

Table 1

Line	Program Segment	Output
1	`int a, b = 2, c, d = 1, e;`	
2	`float p = 3.0, q;`	
3	`a = b * d++;`	
4	`c = ++a / 2 + d;`	
5	`b += a + c % 2;`	
6	`d *= (b - 1) / c;`	
7	`p = c * p / 5;`	
8	`e = --p + 2;`	
9	`q = static_cast<float>(e / 5) * d;`	
10		
11	`cout << "a = " << a << endl;`	a = 3
12	`cout << "b = " << b << endl;`	b = 6
13	`cout << "c = " << c << endl;`	c = 3
14	`cout << "d = " << d << endl;`	d = 2
15	`cout << "e = " << e << endl;`	e = 2
16	`cout << "p = " << p << endl;`	p = 0.8
17	`cout << "q = " << q << endl;`	q = 0

2. Given: `a = 3`, `b = 5`, and `c = 4`, determine the value of variable `z` for the following expressions. Label the order and results of execution for each operator in the boxes as stated in the expressions. The operator that is evaluated first should be labeled as 1, the second operator to be evaluated should be labeled as 2, and so on. Assume all variables of type `int`. For example: **(6 marks)**

	`z`	`=`	`a`	`*`	`b`	`+`	`c`
Order of execution				*1*		*2*	
Results of execution				*15*		*19*	

z = 19

	z	=	a	+	b	*	c	--	%	++	b
Order of execution				5		3		2	4	1	
Results of execution				5		20		4	2	6	

z = 5

3. Determine the output for each code segment below:

(6 marks)

i.

```
int  n1 = 5, n2 = 10;
char code = 'A',code2 = 'Z';
bool t = true;


cout << (n1 + 3 == n2 + 5) << endl;
cout << ((n1 <= 5) && (n2 >= 10)) << endl;
cout << ((code == 'T') || (code2 != 'B')) << endl;
cout << ((t!=0) + 2 < 10) << endl;
```

ii.

```
bool b;
int x;
int y = 7;
b = y;
x = b;

cout <<"The value of x is " << x <<endl;
cout <<"The value of b is " << b <<endl;
```

Answers:

i.

Output
0 1 1 1

ii.

```
The value of x is 1
The value of b is 1
```

4. Determine the output of each code segment below for the given value of **`val = 4`**.

(4 marks)

i.

```
int found = 0, count = val;

if (--count || !found == 0)
cout<< "danger" <<endl;
cout<< "count = " << count <<endl;
```

ii.

```
switch (val)
{
    case 10:
      cout<< "Perfect ";
      break;
    case 8:
      cout<< "Satisfactory ";
      break;
    default:
      cout<< "Unsatisfactory";
}
cout<< " : Pair Programming Evaluation";
```

Answers:

	Output
i.	danger count = 3
ii.	Unsatisfactory: Pair Programming Evaluation

5. Complete program below to test the value of **a** and the program should display as below. **(5 marks)**

```
The given value is positive    or
The given value is negative    or
The given value is zero
```

```
int a; int b;

cout << "Please enter the value to be tested: ";
cin >> a;

 (a >= 0) ? (b = 1) : (b = 2);
```

```
switch (b) {
   case 1 : cout << "The given value is positive\n"; break;
   case 2 : cout << "The given value is negative\n"; break;
   default : cout << "The given value is zero\n";
 }
```

6. Based on the code given in Table 2, **(7 marks)**

Table 2

Line	Program Segment
1	`#include <iostream>`
2	`using namespace std;`
3	`int main()`
4	`{  for (int i = 5; i > 0; i =- 2)`
5	`  {  for (int j = 0; j =< i; j++)`
6	`  {  if (j%2)`
7	`  continue;`
8	`  else`
9	`  if !(j)`
10	`  cout << "i = " << i`
11	`  << ", j = << " j << endl;`
12	`  else`
13	`  break;`
14	`  }`
15	`  }`
16	`  return 0;`
17	`}`

a) Identify and fix the 4 errors in the code by writing the corrected statement in Table 3.

Answers:

Table 3

Line	Corrected Statement

	#include <iostream>
	using namespace std;
	int main()
	{ for (int i = 5; i > 0; i -= 2)
	{ for (int j = 0; j <= i; j++)
	{ if (j%2)
	continue;
	else
	if (!j)
	cout << "i = " << i
	<< ", j = "<< j << endl;
	else
	break;
	}
	}
	return 0;
	}

b) Assuming the errors are fixed, what is the output of the code?

Answers:

i = 5 ,j = 0
i = 3 ,j =0
i = 1 ,j = 0

7. Given a flowchart in **Figure 1**. Complete and write the code segment of the flowchart using:

   i. **`for`** loop statement
   ii. post-test loop statement

   Note: Use a separate code segment for each question. **(15 marks)**

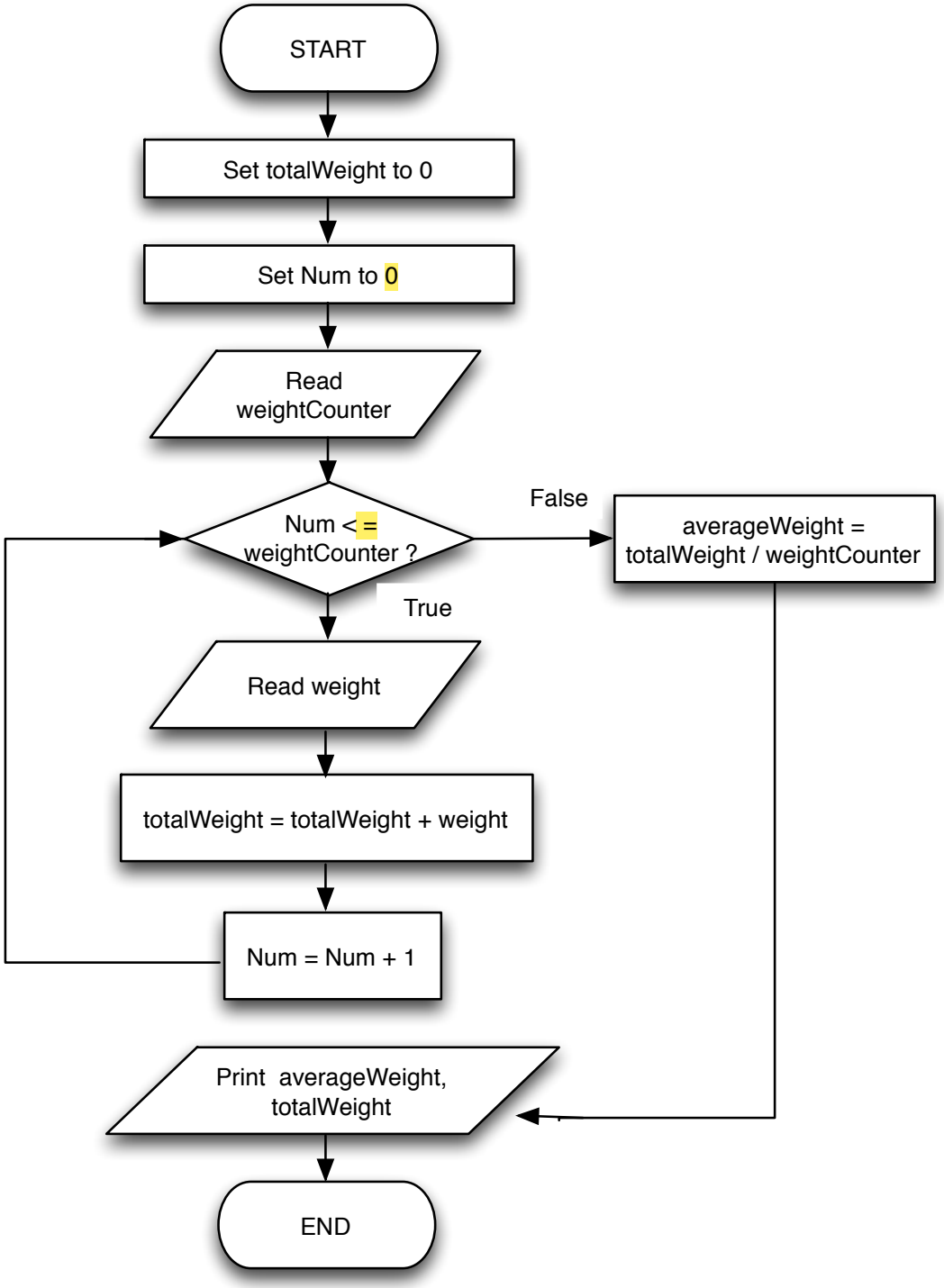
START
Set totalWeight to 0
Set Num to 0
Read weightCounter
Num < = weightCounter ?
False
averageWeight = totalWeight / weightCounter
True
Read weight
totalWeight = totalWeight + weight
Num = Num + 1
Print averageWeight, totalWeight
END

Figure 1

Answers:

i.

```
int weightCounter, totalWeight = 0;
cout << "Enter the number of students:  ";
cin >> weightCounter;


 // Loop with Num <= weightCounter
    for (int Num = 1; Num <= weightCounter; Num++) {
        cin >> weight;
        totalWeight += weight;
    }

    // Calculate average weight
    averageWeight = static_cast<double>(totalWeight) / weightCounter;

    // Print the results
    cout << averageWeight << totalWeight << endl;

    system("pause");


 return 0;
```

ii.

```
int weightCounter, totalWeight = 0;
cout << "Enter the number of students:  ";
cin >> weightCounter;


int Num = 1;
    do {
        if (Num > weightCounter) break; // Ensure the loop doesn't run more than needed

        cout << "Enter weight for student " << Num << ": ";
        cin >> weight;

        totalWeight += weight;
        Num++;
    } while (Num <= weightCounter);

    // Calculate average weight
    averageWeight = static_cast<double>(totalWeight) / weightCounter;

    // Print the results
    cout << averageWeight << totalWeight << endl;




 return 0;
```

8. **Program 1** below is meant to ask the user to enter two sides of a right triangle, **a** and **b** respectively, and display the length of hypotenuse. The length of hypotenuse is expressed by the following formula:

$$\sqrt{(a)^2 + (b)^2}$$

Complete **Program 1**, based on the instructions or comments written in (a) to (e).

(8 marks)

Line	Program 1
1	`#include <iostream>`
2	`#include <cmath>`
3	`using namespace std;`
4	`int main()`
5	`{`
6	`// (a) Declare length for side a, side b and hypotenuse`
7	`double side_a, side_b, hypeotenuse;`
8	`// Display a corresponding prompt to the user`
9	`cout << "Enter the length of side a";`
10	`// (b) Input length side a`
11	`cin >> side_a;`
12	`// Display a corresponding prompt to the user`
13	`cout << "Enter the length of side b";`
14	`// (c) Input length side b`
15	`cin >> side_b;`
16	`// (d) Calculate the length of hypotenuse.`
17	`hypotenuse = sqrt((pow(side_a,2)) + pow(side_b,2))`
18	`// (e) Display the length of hypotenuse.`
19	`cout >> hypotenuse;`
20	`return 0;`
21	`}`

9. Based on the output generated in **Output** column in Table 4, complete the blank spaces with appropriate predefined functions. Table 5 shows a list of predefined functions as a guide. **(7 Marks)**

Table 4

Line	C++ Statements	Output
1	`#include <iostream>`	
2	`#include <iomanip>`	
3	`#include <cstring>`	
4	`#include <cctype>`	
5	`#include <cmath>`	
6	`using namespace std;`	
7	`int main() {`	
8	`  float num1 = 3.0, num2 = -2.5;`	
9	`  char word[15] = "#Programming!!", alp;`	
10	`  for (int i = 0; i <` strlen(word) `; i++) {`	
11	`    alp =` toupper(word[i]) `;`	
12	`    cout << alp; }`	`#PROGRAMMING!!`
13	`  cout << endl;`	
14	`  cout <<` word `<< endl;`	`#Programming!!**`
15	`  cout << fixed << setprecision(3);`	
16	`  cout <<` pow(num1, num2) `<< endl;`	`-15.625`
17	`  cout <<` sqrt(abs(num2)) `<< endl;`	`-2.000`
18	`  cout <<` fabs(num2) `<< endl;`	`2.500`
19	`  return 0;  }`	

Note : Manipulator **`fixed`** and **`setprecision(3)`** are to set the output of decimal precision fix to 3 decimal point.

Table 5

Predefined functions			
fabs (x)	abs (x)	ceil (x)	floor (x)
log (x)	pow (x,y)	sqrt (x)	exp (x)
strlen (x)	strcmp (x,y)	strstr (x,y)	pow10 (x)
strcat (x,y)	strcpy (x,y)	toupper (x)	tolower (x)
isupper (x)	islower (x)	isalpha (x)	isalnum (x)

10. Determine the output for the program segment given in Table 6. Write your output in **Output** column in the table. **(10 Marks)**

Table 6

Line	Program Segment	Output
1	`void T1 (int &A, int B = 0)`	
2	`{`	
3	`   int C;`	
4	`   B = A-- + B - 2;`	
5	`   A += B;`	
6	`   C = A - B;`	
7	`   cout << A << " " << B << " " << C << endl;`	
8	`}`	
9		
10	`void T1 (int &A, int &B, int C, int D = 2)`	
11	`{`	
12	`   C += ++A - B;`	
13	`   B = 2 * C + D;`	
14	`   cout << A << " " << B << " " << C`	
15	`        << " " << D << endl;`	
16	`}`	
17		
18	`int main()`	
19	`{`	
20	`    int n1 = 3, n2 = 2;`	
21	`    T1(n2);`	_____
22	`    T1(n1, n2);`	_____
23	`    cout << n1 << " " << n2 << endl;`	_____
24	`    T1(n2, n1, 2);`	_____
25	`    cout << n1 << " " << n2 << endl;`	_____
26	`    T1(n1, n2, n1-n2, 3);`	_____
27	`    cout << n1 << " " << n2 << endl;`	_____
28	`    return 0;`	
29	`}`	