MANDALAY TECHNOLOGICAL UNIVERSITY
DEPARTMENT OF MECHATRONIC ENGINEERING
First Semester Examination of Second Year
McE 21019 Computer System Architecture and Programming I
Date: 29. 3. 2016. Re-exam Time: 9:00 To 12:00 AM

Answer **ALL** Questions.

1. (a) What is the output of the following program segment?

```
int count = 1;
while (++count <= 5)
  cout << count * (count - 1) << " ";
cout << endl;
```

1. (b) Rewrite the following expressions using the conditional operator.

```
if (hours >= 40.0)
wages = 40 * 7.50 + 1.5 * 7.5 * (hours - 40);
else
wages = hours * 7.50;
```

1. (c) Suppose x, y, and z are int variables and w and t are double variables. What value is assigned to each of these variables after the last statement executes?

```
x = 20;
y = 18;
x = x + y / 4;
z = x % 3 + 4.0;
w = 57 / 3 + 6.5;
t = x / 4.0 + 15 % 4 - 3.5;
```

1. (d) Write a program to find and display the sum and average of the successive integers 1, 2, 3, 4, 5, … , 199, 200.

2. (a) You found an exciting summer job for five weeks. It pays, say, $15.50 per hour. Suppose that the total tax you pay on your summer job income is 14%. After paying the taxes, you spend 10% of your net income to buy new clothes and other accessories for the next school year and 1% to buy school supplies. After buying clothes and school supplies, you use 25% of the remaining money to buy savings bonds. For each dollar you spend to buy savings bonds, your parents spend $0.50 to buy additional savings bonds for you. Write a program that prompts the user to enter the pay rate for an hour and the number of hours you worked each week. The program then outputs the following:

a. Your income before and after taxes from your summer job.
b. The money you spend on clothes and other accessories.
c. The money you spend on school supplies.
d. The money you spend to buy savings bonds.
e. The money your parents spend to buy additional savings bonds for you.

2. (b) In a right triangle, the square of the length of one side is equal to the sum of the squares of the lengths of the other two sides. Write a program that prompts the user to enter the lengths of three sides of a triangle and then outputs a message indicating whether the triangle is a right triangle. Find and output the hypotenuse of the right triangle.

3. Suppose we are given a file consisting of students' names and their test scores, a number **between 0 and 100 (inclusive).** Each line in the file consists of a student name followed by the test score. We want a program that outputs each student's name followed by the test score followed by the grade. The program also needs to output the average test score for the class. The grade consideration is

If the test score is $0 \leq$test score≤ 50, grade is F.
If the test score is $50 <$test score≤ 60, grade is D.
If the test score is $60 <$test score≤ 70, grade is C.
If the test score is $70 <$test score≤ 80, grade is B.
If the test score is $80 <$test score≤ 100, grade is A.

Inputfile name is *PE11inputData.txt* and outputfile name is *PE11outputData.txt*.
Inputfile sample format is:

```
Steve Gill 89
Rita Johnson 91.8
Randy Brown 85.6
Seema Arora 45.60
```

Outputfile sample format is:

```
Steve   Gill      89.00   B
Rita    Johnson   91.80   A
Randy   Brown     85.60   B
Seema   Arora     45.60   F

Class Average:  78.00
```

4. The population of a town A is less than the population of town B. However, the population of town A is growing faster than the population of town B. Write a program that prompts the user to enter the population and growth rate of each town. The program outputs after how many years the population of town A will be greater than or equal to the population of town B and the populations of both the towns at that time. (A sample input is: Population of town A =5000, growth rate of town A = 4%, population of town B = 8000, and growth rate of town B = 2%)

5. (a) Write a program that prompts the user to input an integer between 0 and 35. If the number is less than or equal to 9, the program should output the number; otherwise, it should output a for 10, b for 11, c for 12 . . . and z for 35.

5. (b) You moved your "character" around an imaginary landscape and discovered castle, sorcerers, treasure and so on, using text—not picture –for input and output. When the game starts, you find yourself on a barren moor. Write that game sample program. You can type north for 'n', south for 's', east for 'e' and west for 'w'. You can go one "unit" north, south, east, or west, while the program keeps track of where you are and reports yours position, which starts at coordinates (10, 10). We'll bury some treasure at coordinates (7, 11) and see whether the player can find it.

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