EAST WEST UNIVERSITY
Department of Computer Science and Engineering
B.Sc. in Computer Science and Engineering Program
Mid Term I Examination, Summer 2019 Semester

Course: CSE 110 Object Oriented Programming, Section-1
Instructor: Mohammad Rezwanul Huq, PhD, Assistant Professor, CSE Department
Full Marks: 30 (15 will be counted for final grading)
Time: 1 Hour and 20 Minutes

Note: There are **6** (**SIX**) questions, answer ALL of them. Course Outcome (CO), Cognitive Level and Mark of each question are mentioned at the right margin.

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1. **Write** a Java program that prompts user to input the three sides of a triangle – *a*, *b* and *c*. According to triangle inequality, the sum of the lengths of any two sides of a triangle must be greater than or equal to the length of the third side. [CO1, C2, Mark: 5]

Given the values of *a*, *b* and *c*, your program must print "It is a triangle" if values of *a*, *b* and *c* satisfies triangle inequality; otherwise, the program must print "It is not a triangle". In your program, you must use appropriate methods of **JOptionPane** class to read input and show output.

2. **Write** a Java program that generates the following series given the values of a, b and n by the user. Use **Scanner** class to read user input. [CO1, C2, Mark: 5]

$a+2^0*b,\ a+2^0*b+2^1*b,\ \ldots\ \ldots\ \ldots\ ,\ a+2^0*b+2^1*b+\ \ldots\ \ldots\ \ldots\ +2^{n-1}*b$

Suppose, a = 0, b = 2 and n = 5 will produce the following numbers:

$s0 = 0 + 2^0*2 = 2$
$s1 = 0 + 2^0*2 + 2^1*2 = 6$
$s2 = 0 + 2^0*2 + 2^1*2 + 2^2*2 = 14$
$s3 = 0 + 2^0*2 + 2^1*2 + 2^2*2 + 2^3*2 = 30$
$s4 = 0 + 2^0*2 + 2^1*2 + 2^2*2 + 2^3*2 + 2^4*2 = 62$

Therefore, the resulting series is 2, 6, 14, 30, 62 for the given values of *a*, *b* and *n*.

3. **Write** a Java program that reads the salary values of *n* employees in the university. The university decides to increase the salary of her employees by giving a one-time bonus. The bonus policy is given below: [CO1, C3, Mark: 5]

- If the salary is more than or equal to 100000, he/she will be given 5% raise.
- If the salary is more than 50000 and less then 100000, he/she will be given 7.5% raise.
- If the salary is less than 50000, he/she will be given 10% raise plus a fixed amount of 1000 taka.

Your program must compute and print the new salary of the employees and how much extra money university needs to pay in total compared to the previous salary. Use Scanner class to read user input.

4. Consider the following dataset that shows final marks of a set of students in different subjects in EWU. [CO1, C3, Mark: 5]

Name	Subjects				
	CSE103	CSE106	CSE110	CSE207	CSE209
Alice	75	50	65	80	90
Bob	80	45	60	50	70
Charlie	65	60	70	75	80
Danny	40	65	85	65	80
Elton	55	55	75	70	65

Write a program in Java that uses the above-mentioned dataset and computes the total marks for each student. You must use a static method named ***totalMarks*** that takes data of a student (a row) as a parameter and returns the total marks of that student. After computing total marks, print the name of the student who gets the highest among them. A sample output is given below.

```
Final Exam Result
Alice – 360
Bob – 305
Charlie – 350
Danny – 335
Elton - 320
Alice got the highest mark.
```

5. **Define** a class ***Product*** that has the following private instance variables. [CO1, C3, Mark: 5]

- productId (int type)
- productName (String type)
- productPrice (double type)

The Product class must have appropriate constructors, setters and getters.
Furthermore, the class also has the following instance methods:

- **toString()**: the method returns a string containing product information. As an example, you may return the string in the following format:
  Product ID 1 has name Apple that has price 220.0 taka.
- **compareTo(Product p)**: the method returns 1 if the price of the caller object (product) is more than the price of the callee object (product); returns 0 if their prices are same; returns -1 otherwise.
- **updatePrice()**: the method updates the price of the product by increasing the current price by 10%.

You should only write the class definition.

6. **Write** a Java program that creates an array of size *n* of ***Product*** type objects, as specified in question no. 5. The value of *n* will be provided by the user. User may also input the values of *Product* type objects. Use Scanner class to read user input. [CO1, C3, Mark: 5]

Your program should have the following static method.

searchByPrice (Product[] p, int lower, int upper)

The method takes three parameters – *Product* type array that you have created and assigned with some *Product* type objects, an integer value *lower* and an integer value *upper*.

The method will find products which will satisfy the following condition and print their information using *toString()* method in *Product* class:

lower <= *productPrice* <= *upper*

The *main* method must call *searchByPrice()* method with appropriate parameters and print the result accordingly.