18F_CST8110_300 – Introduction to Programming
Midterm Exam
Tuesday, October 16, 2018

Name: _____

Student Number: _____

Instructions:

1. Print your name and student number above.
2. The exam is 1.5 hours in duration and consists of 6 pages: 25 questions and 35 marks.
3. No calculators are allowed.
4. If you have a cell phone, pager, or any electronic device with you – please be sure it is turned off now. (**You will get zero if it is on during the exam**)
5. Answer the multiple choice questions on the Scantron form in pencil. DO NOT erase on the Scantron form. Ask for another form if you have made a mistake. Answer all other questions on the test paper.
6. Multiple choice questions are worth 1 mark each, short answer questions are worth as indicated.
7. All papers must be returned – you may NOT keep the exam paper.
8. If you have a question, raise your hand and your professor will come to you and answer your question.

I have read, understood, and will comply with all of the above instructions:

_____ _____

Sign your full name here date

Multiple Choice Questions (1-19) – worth 1 mark each.

1. Which of the following translates the statements in java source file (.java) to bytecode file (.class)?

a) Compiler
b) Editor
c) Loader
d) Bytecode verifier

2. Which of the following data type uses the least bits in memory?

a) int b) **boolean** c) double d) float

3. Which of the following data type uses the most bits in memory?

a) int b) boolean c) **double** d) float

4. What value is in memory for the variables num1 after the following executes?

```
int num1 = (2 + 10)*5 / 3 % 3;
```

a) **2** b) 3 c) 0 d) 1 e) 4

5. Select all of the following statements that are NOT **true**:

i) Class name must be **exactly** the same as the java file name.
ii) Default constructor must not have any parameters.
iii) There can **only** be one constructor per class.
iv) There is strict spacing requirement to compile java code from a terminal.

a) All of the above b) iii c) i and iii d) i and ii e) ii and iii

6. The purpose of a constructor in a class is:

a) to allocate memory for the methods of an object.
b) to read data into a class.
c) to allocate memory for the instance variables of an object.
d) none of the above.

7. Which of the following will print the letter "t" for the statement: String letters="peter";

a) System.out.println(letters.charAt(1));
b) System.out.println(letters.charAt(2));
c) System.out.println(letters.charAt(3));
d) System.out.println(letters.charAt(letters.length()));
e) Both answers c and d

8. To compile and run a Java source code file ***HelloWorld.java***, which commands should be used sequentially at a Command Prompt?

a) javac HelloWorld
java HelloWorld
b) Javac HelloWorld.java
Java HelloWorld
c) compile HelloWorld.java
java HelloWorld
d) javac HelloWorld.java
java HelloWorld

9. The statement in main **System.out.println(1+1+1+" is "+(1+1)+1);** would print:

a) 3 is 3
b) 111 is 3
c) 3 is 111
d) 3 is 21
e) Compile error

10. Select all datatypes that are NOT considered primitives in Java?

i) int ii) float iii) String iv) Double v) char

a) iii and iv b) i, ii and v c) all of the above d) iv and v e) i and v

11. What will display (exactly) from the following segment of code?

```
System.out.print ("My name is:\n" + "Mohammad ");
System.out.println ("Patoary");
System.out.print ("Your name is: " );
```

a) My name is: Mohammad Patoary
Your name is:

b) My name is: Mohammad
Patoary
Your name is:

c) My name is:\n
Mohammad Patoary
Your name is:

d) **My name is:**
Mohammad Patoary
Your name is:

12. Given a method in a class is **public double calcArea (double length, double width){…}**. What is a valid call statement on object obj1 of the class in main while passing the parameters length and width are 2.5 and 1.5 respectively?

a) double y = obj1.calcArea (2.5, 1.5);
b) double y = obj1.calcArea (double 2.5, double 1.5);
c) float y = calcArea (obj1, 2.5, 1.5);
d) double y = obj1(2.5, 1.5).calcArea ();
e) double y = obj1.calcArea (double length, double width);

13. Which of the following statements about methods is **true**?

a) All the parameters **must** be the same type.
b) A method can have a parameter of type void.
c) A method can return more than one type.
d) A class can have two methods with the same name and parameter list, as long as they return a different type.
e) A method can have a return type of void.

14. Which one of the following statements is **true?**

a) Declaring a class uses memory, declaring an object does not.
b) **Declaring an object uses memory, declaring a class does not**.
c) Declaring a class or an object uses memory.
d) Declaring a class or an object does not uses memory.

15. What will be the output of the following java code?

```
public class StringExample2 {
    public static void main (String [ ] args) {
        String name1 = "Jack";
        String name2 = new String ("Peter");
        name2 = name1;
        System.out.println (name1+name2);
    }
}
```

a) JackJack
b) PeterPeter
c) JackPeter
d) PeterJack

16. What will be the output of the following java code? (Hints: post operator gets the lowest precedence.)

```
public class test {
      public static void main(String[] args) {
            int x = 5, y = 10, z = 1;
             z += ++x + ++y + z++;
            System.out.println("x is:" + x );
            System.out.println("y is:" + y );
            System.out.println("z is:" + z );
     }
}
```

a)
```
x is:6
y is:11
z is:18
```

b)
```
x is:6
y is:11
z is:19
```

c)
```
x is:6
y is:11
z is:17
```

d)
```
x is:6
y is:10
z is:20
```

Given the following classes '***Employee***' and '***EmployeeInput***' inside the same package of a project (i.e. under same project), answer questions 17-25:

```
import java.io.*;
import java.util.Scanner;

public class Employee {
   String empName;
   int empAge;
   double empSalary;

   public Employee() {
       empName = "";
      empAge = 0;
      empSalary = 00000;
   }
   public void setName(String name) {
       empName = name;
   }
   public void setAge(int age) {
          empAge = age;
   }
   public void setSalary(double salary) {
       empSalary = salary;
   }
   public void printEmployee() {
      System.out.println("Name:"+ empName );
      System.out.println("Age:" + empAge );
      System.out.println("Salary:" + empSalary);
   }

}//end of class
```

```
import java.util.Scanner;

public class EmployeeInput {
       public static void main(String[] args) {
              Scanner input = new Scanner(System.in);

              Employee empOne = new Employee();
              empOne.printEmployee();

              System.out.println("Enter the name of the employee:");
              String name = input.nextLine();

              System.out.println("Enter  the age of the employee:");
              int age  = input.nextInt();

              System.out.println("Enter  the salary of the employee:");
              double salary  = input.nextDouble();

        }//end of main()
}//end of class
```

17. If you compile and run '***EmployeeInput.java***', what will be the output of the following statement?

```
empOne.printEmployee();
```

a) Name:
   Age:0
   Salary:0

b) **Name:**
   Age:0
   Salary:0.0

c) Name:""
   Age:0
   Salary:0.0

d) Name:""
   Age:0
   Salary:00000

18. If the following statements were in main method of ***EmployeeInput*** class:

```
Employee empOne = new Employee();
Employee empTwo = new Employee();
```

Would empOne and empTwo point to the same memory location?

a) Yes
b) No
c) Depends on the operating system
d) Depends on the compiler

19. If the data type of empSalary was changed to String, what other changes MUST to be done?

a) The constructor and printEmployee method.
b) Just the constructor.
c) Just the printEmployee method.
d) The constructor, setSalary and printEmployee method.
e) **The constructor and setSalary method.**

20. Write statements to set the name, age and salary of the object ***empOne*** based on the corresponding values obtained from the keyboard. **(3 marks) (Requirement: You must not modify *Employee* class.)**

```
empOne.setName(name);
empOne.setAge(age);
empOne.setSalary(salary);
```

21. Write a statement to display the name, age and salary of the object ***empOne*** obtained from the keyboard. **(2 mark) (Requirement: You must not modify *Employee* class)**

```
empOne.printEmployee();
```

22. Write an initial constructor for the ***Employee*** class. **(3 marks)**

```
public Employee(String name, int age, double salary){
        empName = name;
        empAge = age;
        empSalary = salary;
    }
```

23. Write a statement to create an object ***empThree*** using the initial constructor and the corresponding values obtained from the keyboard. **(2 marks) (Requirement: You must not modify *Employee* class)**

```
Employee empThree = new Employee(name,age,salary);
```

24. Write a copy constructor for the ***Employee*** class. **(3 marks)**

```
public Employee(Employee emp){
     empName = emp.empName;
     empAge = emp.empAge;
     empSalary = emp.empSalary;
}
```

25. Write a new method called "***calcBonus***" for the ***Employee*** class above. The ***calcBonus*** method returns a value to the user of the employee's bonus, which will be computed in the above method based on the following criteria:

- Employees with salary less than or equal to $ 5,000.00, will get 5% bonus, otherwise employees will get 4% bonus. **(3 marks).** Hints: you need to use if-else as follows:

```
if (condition){
    //bonus calculation.
} else {
   //bonus calculation.
}
```

```
public double calcBonus(){
     if(empSalary<=5000.0)
          return empSalary*5.0/100.0;
     else
          return empSalary*4.0/100.0;
}
```