Homework

The following homework is designed to cover the course objectives for this unit.

Project 1

Your first project for this course is due at the beginning of Unit 5. Your instructor will provide you with a complete description of the projects for this course. Please refer to that handout for complete details.

Homework Exercise 4.1

Submit your written answers to the following 20 questions to your instructor at the beginning of Unit 5.

1. Analyze the following code:

```
class TempClass {
  int i;
  public void TempClass(int j) {
    int i = j;
  }
}

public class C {
  public static void main(String[] args) {
    TempClass temp = new TempClass(2);
  }
}
```

What will happen when the code is executed?

a. The program compiles and runs fine.
b. The program has a compilation error because TempClass does not have a constructor with an int argument.
c. The program compiles fine, but it does not run because class C is not public.
d. The program has a compilation error because TempClass does not have a default constructor.

2. Analyze the following code:

```
public class Test {
  public static void main(String[] args) {
    Count myCount = new Count();
    int times = 0;

    for (int i=0; i<100; i++)
      increment(myCount, times);

    System.out.println(
      "myCount.count = " + myCount.count);
    System.out.println("times = "+ times);
  }

  public static void increment(Count c, int times) {
    c.count++;
    times++;
  }
}

class Count {
  int count;

  Count(int c) {
    count = c;
  }

  Count() {
    count = 1;
  }
}
```

What will be the value of "times"?

a. 100
b. 98
c. 99
d. 0
e. 101

3. What is the printout of the second println statement in the main method?

```
public class Foo {
  int i;
  static int s;

  public static void main(String[] args) {
    Foo f1 = new Foo();
    System.out.println("f1.i is " + f1.i + " f1.s is " + f1.s);
    Foo f2 = new Foo();
    System.out.println("f2.i is " + f2.i + " f2.s is " + f2.s);
    Foo f3 = new Foo();
    System.out.println("f3.i is " + f3.i + " f3.s is " + f3.s);
  }

  public Foo() {
    i++;
    s++;
  }
}
```

a. f2.i is 2 f2.s is 2
b. f2.i is 1 f2.s is 2
c. f2.i is 1 f2.s is 1
d. f2.i is 2 f2.s is 1

4. What is the printout for the first statement in the following main method?

```
public class Foo {
  static int i = 0;
  static int j = 0;

  public static void main(String[] args) {
    int i = 2;
    int k = 3;
    {
      int j = 3;
      System.out.println("i + j is " + i + j);
    }

    k = i + j;
    System.out.println("k is " + k);
    System.out.println("j is " + j);
  }
}
```

a. i + j is 23
b. i + j is 5
c. i + j is 22
d. i + j is 6

5. Analyze the following code:

```
public class Test {
  int x;

  public Test(String t) {
    System.out.println("Test");
  }

  public static void main(String[] args) {
    Test test = null;
    System.out.println(test.x);
  }
}
```

What will happen when the code is executed?

a. The program has a syntax error because Test is not initialized.
b. The program has a syntax error because Test does not have a default constructor.
c. The program has a syntax error because x has not been initialized.
d. The program has a syntax error because an object cannot be created from the class that defines the object.
e. The program has a runtime NullPointerException because Test is null while executing test.x.

6. What is the printout of the third println statement in the main method?

```
public class Foo {
  int i;
  static int s;

  public static void main(String[] args) {
    Foo f1 = new Foo();
    System.out.println("f1.i is " + f1.i + " f1.s is " + f1.s);
    Foo f2 = new Foo();
    System.out.println("f2.i is " + f2.i + " f2.s is " + f2.s);
    Foo f3 = new Foo();
    System.out.println("f3.i is " + f3.i + " f3.s is " + f3.s);
  }

  public Foo() {
    i++;
    s++;
  }
}
```

a. f3.i is 3 f3.s is 1
b. f3.i is 1 f3.s is 3
c. f3.i is 1 f3.s is 1
d. f3.i is 3 f3.s is 3
e. f3.i is 1 f3.s is 2

7. Analyze the following code:

```
class Circle {
  private double radius;

  public Circle(double radius) {
    radius = radius;
  }
}
```

What will happen when the code is executed?

a. The program does not compile because Circle does not have a default constructor.
b. The program has a compilation error because radius cannot be assigned to radius.
c. The program will compile, but an object of Circle cannot be created with a specified radius. The object will always have radius 0.
d. The program has a compilation error because it does not have a main method.

8. Given the declaration Circle[] x = new Circle[10], which of the following statements is most accurate?

   a. x contains an array of 10 int values.
   b. x contains an array of 10 objects of the Circle type.
   c. x contains a reference to an array, and each element in the array can hold a Circle object.
   d. x contains a reference to an array, and each element in the array can hold a reference to a Circle object.

9. Analyze the following code:

```
public class Test {
  public static void main(String[] args) {
    double radius;
    final double PI= 3.15169;
    double area = radius * radius * PI;
    System.out.println("Area is " + area);
  }
}
```

   What will happen when the code is executed?

   a. The program has a syntax error because a constant PI is defined inside a method.
   b. The program compiles and runs fine.
   c. The program has a syntax error because the variable radius is not initialized.
   d. The program has no syntax errors but will get a runtime error because radius is not initialized.

10. Suppose you want to provide an accessor method for a Boolean property finished. What should the signature of the method be?

    a. public boolean getFinished()
    b. public void isFinished()
    c. public boolean isFinished()
    d. public void getFinished()

11. Analyze the following code:

```
public class Test {
  private int t;

  public static void main(String[] args) {
    int x;
    System.out.println(t);
  }
}
```

What will happen when the code is executed?

a. The variable t is private and, therefore, cannot be accessed in the main method.
b. The variable x is not initialized and, therefore, causes errors.
c. The variable t is non-static, and it cannot be referenced in a static context in the main method.
d. The variable t is not initialized and, therefore, causes errors.
e. The program compiles and runs fine.

12. Analyze the following code:

```
public class Test {
  int x;

  public Test(String t) {
     System.out.println("Test");
  }

  public static void main(String[] args) {
    Test test = new Test();
    System.out.println(test.x);
  }
}
```

What will happen when the code is executed?

a. The program has a syntax error because an object cannot be created from the class that defines the object.
b. The program has a syntax error because Test does not have a default constructor.
c. The program has a syntax error because System.out.println method cannot be invoked from the constructor.
d. The program has a syntax error because x has not been initialized.

13. Which of the following is an advantage of encapsulation?

    a. Making the class final causes no consequential changes to other code.
    b. Encapsulation changes a class's contract without changing the implementation and causes no consequential changes to other code.
    c. Encapsulation changes the implementation without changing a class's contract and causes no consequential changes to other code.
    d. Only public methods are needed.

14. Analyze the following code:

```
public class Test {
  public static void main(String[] args) {
    int n = 2;
    xMethod(n);

    System.out.println("n is " + n);
  }

  void xMethod(int n) {
    n++;
  }
}
```

    What will happen when the code is executed?

    a. The code prints n as 1.
    b. The code prints n as 3.
    c. The code has a syntax error because xMethod is not declared static.
    d. The code has a syntax error because xMethod does not return a value.
    e. The code prints n as 2.

15. Analyze the following code and choose the best answer:

```
public class Foo {
  private int x;

  public static void main(String[] args) {
    Foo foo = new Foo();
    System.out.println(foo.x);
  }
}
```

a. Since x is defined in the class Foo, it can be accessed by any method inside the class without using an object. The code can be written to access x without creating an object such as foo in this code.
b. A self-referenced object cannot be created; that is, foo is created inside the class Foo.
c. Since x is an instance variable, it cannot be directly used inside a main method. However, it can be accessed through an object such as foo in this code.
d. Since x is private, it cannot be accessed from an object foo.

16. Analyze the following code:

```
public class Test {
  public static void main(String args[]) {
    NClass nc = new NClass();
    nc.t = nc.t++;
  }
}

class NClass {
  int t;
  private NClass() {
  }
}
```

What will happen when the code is executed?

a. The program compiles but has a runtime error because t has no initial value.
b. The program compiles and runs fine.
c. The program has a compilation error because the NClass class has a private constructor.
d. The program does not compile because the parameter list of the main method is wrong.

17. What is the printout for the third statement in the main method?

```
public class Foo {
  static int i = 0;
  static int j = 0;

  public static void main(String[] args) {
    int i = 2;
    int k = 3;
    {
      int j = 3;
      System.out.println("i + j is " + i + j);
    }

    k = i + j;
    System.out.println("k is " + k);
    System.out.println("j is " + j);
  }
}
```

a. j is 0
b. j is 2
c. j is 1
d. j is 3

18. To declare a constant MAX_LENGTH as a member of the class, you write:

a. static double MAX_LENGTH = 99.98;
b. final static float MAX_LENGTH = 99.98;
c. final double MAX_LENGTH = 99.98;
d. final static double MAX_LENGTH = 99.98;
e. final static MAX_LENGTH = 99.98;

19. What is the value of myCount.count displayed?

```
public class Test {
  public static void main(String[] args) {
    Count myCount = new Count();
    int times = 0;

    for (int i=0; i<100; i++)
      increment(myCount, times);

    System.out.println(
      "myCount.count = " + myCount.count);
    System.out.println("times = "+ times);
  }

  public static void increment(Count c, int times) {
    c.count++;
    times++;
  }
}

class Count {
  int count;

  Count(int c) {
    count = c;
  }

  Count() {
    count = 1;
  }
}
```

a. 100
b. 101
c. 99
d. 98

20. What is the printout for the second statement in the main method?

```
public class Foo {
  static int i = 0;
  static int j = 0;

  public static void main(String[] args) {
    int i = 2;
    int k = 3;
    {
      int j = 3;
      System.out.println("i + j is " + i + j);
    }

    k = i + j;
    System.out.println("k is " + k);
    System.out.println("j is " + j);
  }
}
```

a. k is 3
b. k is 0
c. k is 2
d. k is 1