Homework

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

Project 2

Your second project for this course is due at the beginning of Unit 7. 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 6.1

Submit your written answers to the following 20 questions to your instructor at the beginning of Unit 7.

1. The following two programs display the same result.

```
// Program 1
public class Test {
  public static void main(String[] args) {
    Object a1 = new A();
    Object a2 = new A();
    System.out.println(((A)a1).equals((A)a2));
  }
}

class A {
  int x;

  public boolean equals(A a) {
    return this.x == a.x;
  }
}
```

```
// Program 2
public class Test {
  public static void main(String[] args) {
    A a1 = new A();
    A a2 = new A();
    System.out.println(a1.equals(a2));
  }
}

class A {
  int x;

  public boolean equals(A a) {
    return this.x == a.x;
  }
}
```

a. True
b. False

2. Encapsulation means ______________.

   a. that a class can contain another class
   b. that data fields should be declared private
   c. that a class can extend another class
   d. that a variable of supertype can refer to a subtype object

3. What is the output of the following code?

```
import java.util.Date;

public class Test {
  public static void main(String[] args) {
    Date date1 = new Date();
    Date date2 = new Date();
    System.out.print((date1 == date2) + " " + (date1.getClass() ==
date2.getClass()));
  }
}
```

   a. false true
   b. false false
   c. true true
   d. true false

4. What is the output of the following program?

```
public class Test {
  public static void main(String[] args) {
   new A();
  }

  {
   System.out.print("Z");
  }
}

class A extends B {
  A() {
   System.out.print("A");
  }

  {
   System.out.print("X");
  }
}

class B {
  B() {
   System.out.print("B");
  }

  {
   System.out.print("Y");
  }
}
```

a. XYAB
b. ABXYZ
c. BXAY
d. YBXAZ
e. YBXA

5. Analyze the following code:

```
public class Test {
  public static void main(String[] args) {
    B b = new B();
    b.m(5);
    System.out.println("i is " + b.i);
  }
}

class A {
  int i;

  public void m(int i) {
    this.i = i;
  }
}

class B extends A {
  public void m(String s) {
  }
}
```

What happens when the code is executed?

a. The method m is not overridden in B. B inherits the method m from A and defines an overloaded method m in B.
b. The program has a compilation error because b.m(5) cannot be invoked since the method m(int) is hidden in B.
c. The program has a runtime error on b.i, because i is not accessible from b.
d. The program has a compilation error, because m is overridden with a different signature in B.

6. The visibility of the following modifiers increases in this order:

a. none, if no modifier is used; protected; private; and public
b. private; protected; none, if no modifier is used; and public
c. none, if no modifier is used; private; protected; and public
d. private; none, if no modifier is used; protected; and public

7. Which of the following statements is correct?

a. The finalized method can be invoked to finalize an object.
b. Every object can be cloned using the clone() method.
c. Every class should override the finalized method.
d. The clone() method can be invoked on an array object to create another array.

8. Analyze the following code:

```
public class Test {
  int x;

  { x++; }
}
```

   How will you debug this code?

   a. An instance of Test cannot be constructed because it does not have a constructor.
   b. The program cannot be compiled because the statement x++ must be placed inside a method or a constructor.
   c. When an instance of Test is contructed, the value of x becomes 1;
   d. When an instance of Test is constructed, the value of x becomes 0;

9. A class design requires that a particular member variable be accessible by any subclasses of the same class but not by the classes that are not members of the same package. What should be done to achieve this?

   a. The variable should have no special access modifier.
   b. The variable should be marked protected.
   c. The variable should be marked private and an accessor method provided.
   d. The variable should be marked public.
   e. The variable should be marked private.

10. Suppose ArrayList x contains two strings [Beijing, Singapore]. Which of the following methods will cause the list to become [Beijing, Chicago, Singapore]?

   a. x.add("Chicago")
   b. x.add(0, "Chicago")
   c. x.add(1, "Chicago")
   d. x.add(2, "Chicago")

11. Which of the following modifiers should you use on the members of a class so that they are not accessible to another class in a different package but are accessible to any subclasses in any package?

   a. protected
   b. public
   c. default modifier
   d. private

12. Analyze the following code:

```
public class Test {
  int x;

  static { x++; }
}
```

Which of the following statements is true?

a. The program cannot be compiled because x is non-static but is used in a static initialization block.
b. When an instance of Test is constructed, the value of x becomes 0.
c. When an instance of Test is constructed, the value of x becomes 1.
d. The program cannot be compiled because the statement x++ must be placed inside a method or a constructor.

13. Which of the statements regarding the super keyword is ***incorrect***?

a. You can use super to invoke a super class method.
b. You cannot invoke a method in superclass's parent class.
c. You can use super to invoke a super class constructor.
d. You can use super.super.p to invoke a method in superclass's parent class.

14. Comprehensive polymorphism means ______________.

a. that a class can extend another class
b. that a class can contain another class
c. that a variable of supertype can refer to a subtype object
d. that data fields should be declared private

15. Debug the following program segment:

```
public class Test {
  public static void main(String[] args) {
    String s = new String("Welcome to Java");
    Object o = s;
    String d = (String)o;
  }
}
```

a. When casting o to s in String d = (String)o, the contents of o is changed.
b. Strings s, o, and d reference the same String object.
c. When assigning s to o in Object o = s, a new object is created.
d. When casting o to s in String d = (String)o, a new object is created.

16. Object-oriented programming allows you to derive new classes from existing classes. This is called ____________.

    a. abstraction
    b. generalization
    c. inheritance
    d. encapsulation

17. What is the output of running class C?

```
class A {
  public A() {
    System.out.println(
      "The default constructor of A is invoked");
  }
}

class B extends A {
  public B() {
    System.out.println(
      "The default constructor of B is invoked");
  }
}

public class C {
  public static void main(String[] args) {
    B b = new B();
  }
}
```

    a. There is no output.
    b. "The default constructor of B is invoked""The default constructor of A is invoked"
    c. "The default constructor of B is invoked"
    d. "The default constructor of A is invoked""The default constructor of B is invoked"
    e. "The default constructor of A is invoked"

18. What is the output of running A?

```
public class A extends B {
  int x = 1;
  public static void main(String[] args) {
    System.out.print(new A().x);
    System.out.print(new B().x);
  }
}

class B {
  int x = 5;
}
```

a. 51
b. 15
c. 55
d. 11

19. What is the output of the following program?

```
public class Test extends Object {
  public static void main(String[] args) {
    Test test = new Test();
  }

  public Test() {
    System.out.print("A");
  }

  {
    System.out.print("B");
  }

  static {
    System.out.print("C");
  }
}
```

a. ABC
b. BAC
c. ACB
d. CBA
e. CAB

20. Suppose you create a class Cylinder to be a subclass of Circle. Debug the following code:

```
class Cylinder extends Circle {
  double length;

  Cylinder(double radius) {
    Circle(radius);
  }
}
```

a. The program has a syntax error because you attempted to invoke the Circle class's constructor illegally.
b. The program compiles fine but has a runtime error because of invoking the Circle class's constructor illegally.
c. The program compiles fine, but you cannot create an instance of Cylinder because the constructor does not specify the length of the cylinder.