Inheritance and Polymorphism Workbook

Answer the Following

1. What is inheritance?

2. Why multiple inheritance is not supported in java?

3. What is `super` in java?

4. What is constructor chaining and how it is achieved in Java ?

5. Why does Java not support operator overloading?

6. Which object oriented concept is achieved by using overloading and overriding? _____

7. What is the difference between static and dynamic polymorphism?

State whether the following are True/False

1. Java supports multiple inheritance for classes but only single inheritance for interfaces. [ ]
2. Inheritance implies an is-a relationship. [ ]
3. The private members of a superclass can be accessed by a subclass.[ ]
4. A subclass inherit both member variables and methods. [ ]
5. An object can be a subclass of another object. [ ]
6. subclass can directly access protected members of a superclass. [ ]
7. If a class is declared final, then no other class can be derived from this class. [ ]
8. You must always use the reserved word super to use a method from the superclass in the subclass. [ ]
9. The class Object is directly or indirectly the superclass of every class in Java. [ ]
10. The superclass inherits all its properties from the subclass. [ ]
11. Ploymorphism applies to static methods. [ ]
12. Overloaded methods can be overriden. [ ]
13. Main method can be overloaded. [ ]

Multiple choice questions

1. Which of these can be overloaded?
   (a) Methods
   (b) Constructors
   (c) Both a and b
   (d) none
2. What is the process of defining two or more methods with in same class that have same name but different parameters declaration?
   (a) method overloading
   (b) method overriding
   (c) method hiding
   (d) none
3. Which of these keywords can be used to prevent method overriding?

(a) static
(b) constant
(c) protected
(d) final

4. Which of these keyword is used to inherit a class?

(a) super
(b) extends
(c) this
(d) implements

5. Which of these keywords is used to refer to member of base class from a sub class?

(a) upper
(b) super
(c) this
(d) none

6. Which of these is correct way of inheriting class A by class B?

(a) class A extends B
(b) class B inherits class A
(c) class B extends A
(d) class B extends class A

7. A class member declared protected becomes member of subclass of which type?

(a) public member
(b) private member
(c) protected member
(d) static member

8. What restriction is there on using the super reference in a constructor?

(a) It can only be used in the parent's constructor.
(b) Only one child class can use it.
(c) It must be used in the last statement of the constructor.
(d) It must be used in the first statement of the constructor.

9. Which of the following is not an advantage of using inheritance?

(a) Code that is shared between classes needs to be written only once.

(b) Similar classes can be made to behave consistently.

(c) Enhancements to a base class will automatically be applied to derived classes.

(d) One big superclass can be used instead of many little classes.

Exercises

- Write the expected output, or compiler errors if any, for each of the following programs in the box provided below each program.
- Then execute the programs and check your answers.
- Then answer the questions given below.

Program 1

```
1  class Super {
2      public int num = 0;
3      public Super(String text) { /* Line 4 */
4          num = 1;
5      }
6  }
7  class Sub extends Super {
8      public Sub(String text) {
9          num = 2;
10     }
11     public static void main(String args[]) {
12         Sub sub = new Sub(``Hello'');
13         System.out.println(sub.num);
14     }
15 }
```

Q1: What will be the output of the program?

Program 2

```
1  class Creature {
2      void grow() {
3      }
4  }
```

```
5  class Bird extends Creature {
6      void fly() {
7      }
8  }
9  class Falcon extends Bird {
10     void hunt() {
11     }
12 }
13 public class Tester {
14     public static void main(String[] args) {
15         Creature c1 = new Bird();
16         Falcon c2 = new Falcon();
17         // insert code here
18     }
19 }
```

Q1: What inserted, independently at // insert code here , will compile?

Program 3

```
1  class A {
2      A() {
3          System.out.println(``Hello'');
4      }
5  }
6  class InitDemo extends A {
7      A ob = new A();
8      InitDemo() {
9          System.out.println(``hello 1'');
10     }
11     public static void main(String[] args){
12         System.out.println(``Hello 2'');
13         new InitDemo();
14     }
15 }
```

Q1: What will be the output of the above code?

Program 4

```
1  class Base {
2      int value = 0;
3      Base() {
4          addValue();
5      }
6      void addValue() {
7          value += 10;
8      }
9      int getValue() {
10         return value;
11     }
12 }
13 class Derived extends Base {
14     Derived() {
15         addValue();
16     }
17     void addValue() {
18         value +=  20;
19     }
20 }
21 public class Test {
22     public static void main(String[] args) {
23         Base b = new Derived();
24         System.out.println(b.getValue());
25     }
26 }
```

Q1: What will the above program prints?

Program 5

```
1  class Plant {
2      Plant() {
3          System.out.println(``Plant created'');
4      }
5  }
6  class Tree extends Plant {
```

```
7       Tree() {
8           System.out.println(``Tree created'');
9           super();
10      }
11  }
12  public class Test {
13      public static void main(String args[]) {
14          Tree tree = new Tree();
15      }
16  }
```

Q1: What will the above program print out?

Program 6

```
1   public class Profile {
2       private Profile(int w) { // line 1
3           System.out.println(w);
4       }
5       public static Profile() { // line 5
6           System.out.println(10);
7       }
8       public static void main(String args[]) {
9           Profile obj = new Profile(50);
10      }
11  }
```

Q1: What will the above program prints?

Program 7

```
1   class A {
2       final public int GetResult(int a, int b) {
3           return 0;
4       }
5   }
6   class B extends A {
7       public int GetResult(int a, int b) {
```

```
8           return 1;
9       }
10  }
11  public class Test {
12      public static void main(String args[]) {
13          B b = new B();
14          System.out.println(``x = '' + b.GetResult(0, 1));
15      }
16  }
```

Q1: What will be the output of the program?

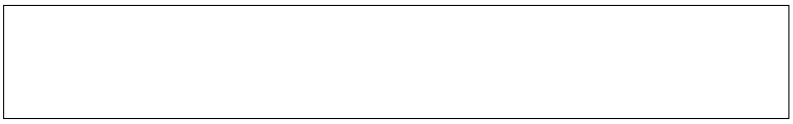
Program 8

```
1   class BoxVar {
2       static void call(Integer... i) {
3           System.out.println(``hi'' +i);
4       }
5       static void call(int... i ) {
6           System.out.println(``hello''+i);
7       }
8       public static void main(String... args) {
9           call(10);
10      }
11  }
```

Q1: What will be the output of the program?

Program 9

```
1   class Test {
2       public static void main(String arg[]) {
3           Number n = 10;
4           int i = 10;
5           System.out.println(n == i);
6       }
7   }
```



Q1: What will be the output of the program?

Program 10

```
1  class Creature {
2      Creature getIt() {
3          return this;
4      }
5  }
6  class Bird extends Creature {
7      // insert code here
8  }
9  class Falcon extends Bird {
10 }
```

Q1: Which statement(s), inserted independently at // insert code here, will compile?