به نام خدا

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فهرست سوالات

سوال اول

الف)

Polymorphism:

Polymorphism in Java is a concept by which we can perform a single action in different ways. Polymorphism is derived from 2 Greek words: poly and morphs. The word "poly" means many and "morphs" means forms. So, polymorphism means many forms. We can perform polymorphism in java by method overloading and method overriding.

Substitution:

Substitutability is a principle in OOP (object-oriented programming) stating that, in a program, if S is a subtype of T, then objects of type T may be replaced with objects of type S (i.e., an object of type T may be substituted with any object of a subtype S) without altering any of the desirable properties of the program (correctness, task performed, etc.). For example, subtyping in declarations:

Number num = new Integer(2000);

Object obj = new String(“Hello World”);

Abstract class:

An abstract class is a class that is declared abstract—it may or may not include abstract methods. Abstract classes cannot be instantiated, but they can be subclassed. It can have constructors and static methods also.

Interface:

Like a class, an interface can have methods and variables, but the methods declared in an interface are by default abstract (only method signature, no body). Interfaces specify what a class must do and not how. It is the blueprint of the class.

If a class implements an interface and does not provide method bodies for all functions specified in the interface, then the class must be declared abstract.

ب)

1) false

A class cannot extend itself in java. error: cyclic inheritance

2) true

If a constructor does not explicitly invoke a superclass constructor, the Java compiler automatically inserts a call to the no-argument constructor of the superclass.

3) true

A subclass inherits all the members (fields, methods, and nested classes) from its superclass.Constructors are not members, so they are not inherited by subclasses.

4) true

The access specifier for an overriding method can allow more, but not less, access than the overridden method. For example, a protected instance method in the superclass can be made public, but not private, in the subclass. But overloaded methods can be less accessible.

5) false

No, we cannot override private or static methods in Java. Private methods in Java are not visible to any other class which limits their scope to the class in which they are declared.

6) true

A Java class can implement multiple Java Interfaces.

ج)

No.	Method Overloading	Method overriding
1	Method overloading is used to increase the readability of the program.	Method overriding is used to provide the specific implementation of the method that is already provided by its super class.
2	Method overloading is performed within class.	Method overriding occurs in two classes that have IS-A (inheritance) relationship.
3	In case of method overloading, parameters must be different.	In case of method overriding, parameters must be the same.
4	Method overloading is the example of compile time polymorphism.	Method overriding is the example of run time polymorphism.
5	In java, method overloading can't be performed by changing the return type of the method only. Return type can be the same or different in method overloading. But you must have to change the parameter.	Return type must be same or covariant in method overriding.

سوال دوم

الف)

```
Animal a = new Husky();
```

درست، زیرا کلاس Husky طی ۳ مرحله از کلاس Animal ارث بری می‌کند.

```
Cow c = new Mammal()
```

نادرست، زیرا کلاس فرزند نمی‌تواند به کلاس پدر رفرنس داشته باشه.

```
Mammal m = new Bulldog();
```

درست، زیرا کلاس Bulldog طی ۳۲ مرحله از کلاس Mammal ارث بری می‌کند.

```
Parrot p = new Bird();
```

نادرست، زیرا کلاس فرزند نمی‌تواند به کلاس پدر رفرنس داشته باشه.

ب)

```
m2 = m1;
m1 = d2;
d2 = d1;
a3 = a2;
a1 = m1;
a2 = m2;
a3 = h1;
m2 = h1;
a1 = c1;
```

تمامی دستورات بالا درست هستند. در هر کدوم رفرنس یک کلاس پدر به یک کلاس فرزند اشاره داره.