LEC12 OOP 2018-2019

Problems:

Example (trace):

```
class BaseClass {
public void foo() {
System.out.println("Base class");}}

class SubClass extends BaseClass
{

}

public class Program {
 public static void main(String[] args) {
 SubClass s = new SubClass();
      s.foo(); }}
```

Output:
Base class

Example (Trace):

```
public class A {
   protected int x,y;
   public void set1(int m, int n){
     x=m;y=n;    }
   public void print1(){
     System.out.println(x+"   "+y);    } }
public class B extends A{
 private int r,s;
   public void set2(){
     r=10;s=20;
     x=100;y=200    }
   public void print2(){
     System.out.println(r+"   "+s);
     System.out.println (x+"   "+y);    } }
public class JavaApplication29 {
   public static void main(String[] args) {
     A aa=new A();
     aa.set1(5,6);       aa.print1();
     B bb=new B();
     bb.set2();       bb.print2();    }}
```

Output:
5   6
10   20
100   200

1- If we change the method set to the following:

```
public class B extends A{
  private int r,s;
   public void set2(){
     r=10;s=20;
     set1(15,50);    }
   public void print2(){
     System.out.println(r+"   "+s);
print1();
   } }
```

The output will be
```
   5   6
   10  20
   15 50
```

2- If we change the method print2 to:

```
public void print2(){
     System.out.println(r+"   "+s+"   "+x+"   "+y);          }
```

The output will be :
```
5   6
10   20   15   50
```

3- If we change protected to private int x,y
And set method used to set2 r , s , x ,y
The program will cause error? Why
Because we try to access a private member from out of class (class B);

4- if we change protected to private int x,y

And set method used to set2 r , s and calls set1(15,50)

The answer will be :
```
5   6
10   20
15   50
```

WHY?!!

Overloading methods throw subclasses

The methods of the super class could be overloaded throw the sub class…
The following example shows that:

```
public class A {
protected int x;
protected int y;
public int z;
public void set(){
x=10;y=20;z=30;}
}
Public class B extends A{
public  int  m,n;
public void set(int m1,int n1){
m=m1;n=n1;}
}

public class C extends B{
private  int r,s;
public void set(int t1,int t2,int  t3,int t4){
set(t1,t2);
set();
r=t3;s=t4; }
public void print(){
System.out.println(x+"   "+y+"   "+z);
System.out.println(m+"   "+n);
System.out.println(r+"   "+s);}

public class Main{
public static void main(String [] args){
C obj_c=new C();
obj_c.set(1,2,3,4);
obj_c.print();}
}
```

The output will be
10   20   30
1   2
3   4

If we replace the main method by the following:
```
B obj_b=new B();
obj_c.set(1,2,3,4);
obj_c.print();
```

the program will be caused error why?

If we write class C as below:

```
public class C extends B {
private int r,s;
public void set(int t1,int t2,int  t3,int t4){
set(t1,t2);

r=t3;s=t4;}
public void print(){
System.out.println(x+"   "+y+"   "+z);
System.out.println(m+"   "+n);
System.out.println(r+"   "+s);}
}
```

The output will be:
0   0   0
1   2
3   4

Why?

If we write class C and B as below:

```
public class C extends B {
private int r,s;
public void set(int t1,int t2,int  t3,int t4){
set(t1,t2);

r=t3;s=t4;
}
public void print(){
System.out.println(x+"   "+y+"   "+z);
System.out.println(m+"   "+n);
System.out.println(r+"   "+s);}

}
public class B extends A {
public  int  m,n;
public void set(int m1,int n1){
m=m1;n=n1;
set();}
}
```

The output will be :
10   20   30
1   2
3   4

Why?

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Example1 (Program):
Define a base class called Polygon which has two integer attributes represent width and height of a Polygon. Set method is used for setting the width and the height. Derive one subclasses Rectangle which inherits all members from polygon and add a new method area that used for calculating rectangle area. Write a main class to create 3 rectangles and print the areas of these rectangles.

Example2 (Program):
Define a base class called Polygon which has two integer attributes represent width and height of a Polygon. Set method is used for setting the width and the height. Derive one subclasses Rectangle which inherits all members from polygon and add a new method area that used for calculating rectangle area. Write a main class to create **1** rectangles object and use it to print areas of three rectangles

Example3 (Program):
Define a base class called Polygon which has two integer attributes represent width and height of a Polygon. Set method is used for setting the width and the height. Derive three subclasses Rectangle, Triangle and Square. Write a main class to create rectangle , square and triangle and print the areas of these polygons.

1.Which among the following best describes the Inheritance?
a) Copying the code already written.
b) Using the code already written once.
c) Using already defined functions in programming language.
d) Using the data and functions into derived segment.

2. How many basic types of inheritance are provided as OOP feature?
a) 4
b) 3
c) 2
d) 1

3. Which among the following best defines single level inheritance?
a) A class inheriting a derived class.
b) A class inheriting a base class.
c) A class inheriting a nested class.
d) A class which gets inherited by 2 classes.

6. Which among the following is correct for hierarchical inheritance?
a) Two base classes can be used to be derived into one single class.
b) Two or more classes can be derived into one class.
c) One base class can be derived into other two derived classes or more.
d) One base class can be derived into only 2 classes.

11. Members which are not intended to be inherited are declared as:
a) Public members.
b) Protected members.
c) Private members.
d) Private or Protected members.

12. Which inheritance in java programming is not supported
a) Multiple inheritance using classes
b) Multiple inheritance using interfaces
c) Multilevel inheritance
d)Single inheritance

13. What is subclass in java?

a) A subclass is a class that extends another class
b) A subclass is a class declared inside a class
c) Both above.
d) None of the above.

14. If class B is subclassed from class A then which is the correct syntax

a) **class** B:A{}
b) **class** B **extends** A{}
c) class B extends class A{}
d) **class** B **implements** A{}

15. Inheritance relationship in Java language is:

a)Association
b)Is-A
c)Has-A
d) None

16.Advantage of inheritance in java programming is/are

a) Code Re-usability
b) Class Extendibility
c) Save development time
d) All

17. In which java oops feature one object can acquire all the properties and behaviors of the parent object?

a) Encapsulation
b) Inheritance
c) Polymorphism
d) None of the above