

# Problem 1

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## Question 1

```
class Y extends X
class Z extends Y

class A {
    Object m(X y, String s);
}
```

**X m(X y, String s)**

It is function subtypes of **A.m**, and this should be a override in Java.

**Y m(Object y, Object s)**

It is a function subtype of **A.m**, and this should be a overload in Java.

**Z m(Y y, String s)**

It is not a function subtype of **A.m**, and this should be a overload in Java

## Question 2

**Triangle** and **IsoscelesTriangle**

It is not the true subtype of **Triangle** because **setSides** in **IsoscelesTriangle** cannot substitute the one in **Triangle** as it does not really make use of **int c**.

**Vertebrate** and **Squid**

It is not the true subtype of **Vertebrate**, since the post-condition of method **int neckBones()** in class **Squid** does not stronger than **Vertebrate**. The client would be surprise by return value **0**.

**Vertebrate** and **Human**

It is the true subtype of **Vertebrate** as the post-condition is stronger in **Human** while others remain the same. The overall specs is stronger comparing with **Vertebrate**.

**Bicycle** and **MountainBike**

It is the true subtype of **Bicycle** as **MountainBike** keeps all original methods' specs the same and adding new method/field. The **MountainBike** can be safely treated as **Bicycle**.

**Account** and **ConcurrentAccount**

It is not the true subtype of `Account` as `ConcurrentAccount` throws exception which will surprise client. As the fact that it cannot use as substitution, `ConcurrentAccount` is not the true subtype.