

1. Which of the  $B.m$  methods below are function subtypes of  $A.m$ ? For each of the  $B.m$  methods answer whether the method would overload or override  $A.m$  in Java. Assume  $Z$  is a subclass of  $Y$ , and  $Y$  is a subclass of  $X$ .

$X.m(X\ y, String\ s);$  An overriding method and is the subtype of  $A.m$

$Y.m(Object\ y, Object\ s);$  An overloading method and is the subtype of  $A.m$

$Z.m(Y\ y, String\ s);$  An overloading method and not the subtype of  $A.m$

2. For each pair of specifications below, answer whether the extending class is a true subtype of its superclass. Explain your answer.
- IsoscelesTriangle is not a true subtype of class Triangle; It is an overriding method, but doesn't have the stronger spec.
  - Squid is not a true subtype of class Vertebrate. This is because class Vertebrate will return Integer greater than 0, but Squid returns 0, it does not satisfy the super class spec.
  - Human is the true subtype of class Vertebrate. Because the neck bones method in Human returns 7 which is stronger than the spec in Vertebrate.
  - MountainBike is the true subtype of class Bicycle, because the parameter for Bicycle can be plugged into MountainBike which means MountainBike is stronger.
  - ConcurrentAccount is not a true subtype of class Account. It throws an exception which clients of Account are not expecting and not handling. ConcurrentAccount does not allow multiple transaction processes at the same time, but class Account does. So, a ConcurrentAccount is not a true subtype.