**Lab 2 Exercises**

**Exercise 1: Dogs, just like Birds, Snakes, and Fish, can move() – Add Dog (and, by extension, all of its subtypes, such as Terrier to the inheritance hierarchy you set up in Example Scenario 2 in the lab. Show that you can now add Dog objects and Terrier objects in the array you created in lab…**

**A computer screen shot of a black and yellow screen

Description automatically generated**

**Exercise 2: We have set up a type hierarchy such that a Student is a subtype of Human Being. The class Student defines a new method called getGPA() that is specific to student. We then do the following:**

*HumanBeing louis = new Student();*

**Question 1: Can the reference variable louis be used to invoke getGPA() ? Why or Why not?**

No because louis is a HumanBeing reference variable.

louis must be downcasted to a Student.

**Question 2: How can we temporarily change the types of reference variables? Describe the difference between upcasting and downcasting. Which is always safe? How can we ensure that the other is also safe on a reference-by-reference basis?**

Casting reference variables will temporarily create another variable of a different type.

Upcasting is always safe since a subclass “is-a” superclass.

You can check to see if downcasting is safe with the boolean operator **instanceof .**

**Exercise 3: Use your creativity – come up with a simple scenario where inheritance might be useful, and implement it, showing how it works, and, in your comments, explain clearly why you did it this way.**

**Submission: Place the Word document (Lab2Results.docx) into your Lab2 subdirectory, alongside Lab2\_starter\_code. Add everything, commit, and push your results.**