CS253 Fall 2013
Midterm #2
Nov. 11, 2014

Your Name (print):_____

You are being given two stapled packets, this packet of questions and a packet of code. The code packet contains two files, header.h (which contains five object class headers) and main.cpp (which includes header.h). You should read the code, and then answer the questions in this packet. Do not write on the code packet (it will not be graded; you may take it with you if you'd like).

The code you are given compiles without errors. (No promises as to whether it generates warnings, however.) Assume it is compiled to an executable names "exec".

You have 1:15 to complete this test. You may not use books, phones, calculators, notes, the internet or your neighbors. All work must be your own.

Do Not Open Until Instructed to Do So!

Don't
Panic

There are some "do as I say, not as I do" elements to this test. I would not normally put multiple class headers in one header file. But it makes for too much paper shuffling if I put every class header in its own file. Also, making your main program be a big switch statement is really bad style. But useful for the purposes of this test.

1. Assume the code is called from the command line as “exec 0”. What does it print out?

2. Assume the code is called from the command line as “exec 1”. What does it print out?

3. (a) Where are the implicit casts in the file *Animal.h*?

   (b) Do the implicit casts generate warnings? Why or why not?

4. Assume the code is called from the command line as “exec 2”. What is printed?

5. Assume the code is called from the command line as “exec 2”. Is there a memory leak? If so, how much data is leaked?

6. Assume the code is called from the command line as “exec 2”. Is data sliced? If so, describe how much and why.

7. Assume the code is called from the command line as “exec 3”. Is there a memory leak? If so, how much data is leaked?

8. Assume the code is called from the command line as “exec 3”. Is data sliced? If so, describe how much and why.

9. Assume the code is called from the command line as “exec 4”? What is printed?

10. Assume the code is called from the command line as “exec 5”? What is printed?

11. When the code is called from the command line as “exec 6”, it prints four lines that look like: “Index = XX; Number = XX; WarmUp Method = XX” What are the four numbers it prints after “Number =” (in order)?

12. When the code is called from the command line as “exec 6”, it prints four lines that look like: “Index = XX; Number = XX; WarmUp Method = XX” What are the four phrases it prints after “WarmUp Method =” (in order)?

13. Which classes in the file *Animal.h* have virtual function pointer tables, and which do not?

14. How many pointers to virtual function pointer tables does an object of type *Fish* have?

15. If the following were added to the definition of the *Fish* class, it would be a compile time error. Explain why.

```
int Number() const {return year_of_birth;}
```

16. Define an overloaded method definition for the << operator in the *Quagga* class. Note: you do not have to implement the operator (*Animal.h* is a header file), just define it (i.e. declare its signature).

17. Now define a stand-alone overloaded << operator for printing *Quaggas* that is NOT part of the *Quagga* class (or any other class). Note: once again, you do not need to implement the operator, just define it.

18. The *Fish* class has two parents (*Product* and *Animal*). Are *Product* and *Animal* orthogonal? Explain why or why not.

19. How many data fields are in an instance of *Fish*? List them by name and data type.

20. What is the parent class of *Animal*?