Computer Science 121
Midterm Exam * Fall 2007

Be sure to show all your work. Remember: exam is closed book. Cellphones, calculators, slide rules, notes, talking, etc., are not permitted. Each question is worth 25 points.

Note: the OilTank class is given at the end of the exam

1. Suppose you are writing a driver class called TankDriver, which will make use of the OilTank class.
   a) In this driver class create an OilTank object called myTank, with owner Hank, with 300 gallon capacity, with 200 gallons of oil in the tank, and with an oil price of $2.59 per gallon.
   b) Write a single print statement in the driver which prints the value of the oil in myTank. (Value is the number of gallons times the price per gallon). Don’t worry about money formatting.
   c) Add a new method to the OilTank class called setPrice, which is passed a new (double) price per gallon, and which sets the calling object's price attribute to this new value.
   d) Add a new method to the OilTank class called halfFull, which returns true if the calling OilTank object is strictly more than half-full; otherwise the method should return false.
   e) Add a new method to the OilTank class called fillUpCost, which prints to the console the amount of money needed to fill up the tank. (Note: don't worry about proper money formatting).

2. Write code for the following loop fragments:
   a) Write a loop that prints to the console, each on a separate line, all of the integers from 70 down to 40. Note: 70 should come first, and 40 should be last.
   b) Using a loop, write statements that will print to the console the sum of all even numbers from 10 to 50.
   c) Write a loop that will print a column of 400 random numbers between 0 and 1 to the console.
   d) Explain what this loop does:
      
      ```java
      for(int j = 1; j != 100; j = j + 10){System.out.println(j);} 
      ```
   e) Write a loop that prints this pattern on a single line.
      dog cat pig dog cat pig dog cat pig ... dog cat pig. There should be 30 of each kind of animal.
3. Write a complete program that does the following: it should read in a single integer - call it n -- from the keyboard. If the number it reads is negative, the program should do nothing. Otherwise it should print, in a column, all of the integers from 1 to n that are NOT divisible by 5.

4. Short answers:
   a) Explain the difference between these two expressions, both of which use equal signs: 1) int a = 17; and 2) (a == 17)
   b) Suppose the last line in the body of a method is:
      return (b <= 12);
      What can you conclude about the return type of the method?
   c) Explain what happens when you execute these two statements:
      String p = "kitty"; p = 12 + p;
   d) The constructor of the OilTank class, below, includes the following statement: this.who = who; Briefly explain how this works.
   e) The OilTank class, below, includes six methods. Which ones can be used to change the state of an OilTank object?

```java
public class OilTank{

    private int capacity; // capacity of tank
    private String who; // tank owner
    private double price; // price per gallon of oil
    private int quantity; // gallons of oil in tank

    public OilTank(String who, int cap, double price, int quant){
        this.who = who;
        capacity = cap;
        this.price = price;
        quantity = quant;
    }

    public int getCapacity(){return capacity;}
    public String getWho(){return who;}
    public double getPrice(){return price;}
    public int getQuantity(){return quantity;}

    public void setQuantity(int amt){ quantity = amt; }

    public void fillTank(){quantity = capacity; }
}
```