**MACS 261J**
**1st Midterm Exam**
**February 13, 2008** **Name:** _____

| Question: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Total |
|---|---|---|---|---|---|---|---|---|
| Points: | 5 | 5 | 5 | 5 | 5 | 5 | 20 | 50 |
| Score: | | | | | | | | |

Question 1 ..... (5 points)

Write a complete Java program that prints "`Go 'Diggers!`".

Question 2 ..... (5 points)

In the Java statement

```
public static final float TWO = 2.0f;
```

what is the meaning of

- the keyword `static`?
- the keyword `final`?
- the `f` in `2.0f`?

Question 3 ..... (5 points)

Java has two types of real numbers: floats and doubles. We must often convert between these types.

(a) [2 points] Write a Java statement that converts a float `x` to a double `y`.

(b) [2 points] Write a Java statement that converts a double `x` to a float `y`.

(c) [1 point] If you first convert a float to a double and then convert that double to a float, will the result equal the float that you started with?

Question 4 ..... (5 points)

What is printed by the following program fragment:

```
for (int n=100; n>0; n=n/2) {
  if (n%2==1)
    System.out.println("n="+n);
}
```

Question 5 ..... (5 points)

Complete the following method:

```
/**
 * Uses a loop to compute and return the smallest integer power
 * of 3 that is not less than a specified positive integer.
 * For example, if n = 10, then this method returns 27.
 * @param n a positive integer.
 * @return smallest power of 3 (1, 3, 9, 27, ...) not less than n.
 */
public static int findPowerOf3(int n) {









}
```

Question 6 ..... (5 points)

Complete the following method:

```
/**
 * Returns the median (middle value) of the three specified values.
 */
public static double median(double a, double b, double c) {









}
```

Question 7 ..... (20 points)

Implement all methods in the classes `BeanBag` and `BeanBagDemo` below:

```
import java.util.Random;

/**
 * A bag of white and black beans.
 */
public class BeanBag {

  /**
   * The colors black and white.
   */
  public static final int BLACK = 0;
  public static final int WHITE = 1;

  /**
   * Constructs a bag with the specified numbers of beans.
   * @param nblack number of black beans.
   * @param nwhite number of white beans.
   */
  public BeanBag(int nblack, int nwhite) {



  }

  /**
   * Returns the total number of beans in the bag.
   * @return the number of beans.
   */
  public int countBeans() {


  }

  /**
   * Determines whether this bag is empty.
   * @return true, if empty; false, otherwise.
   */
  public boolean isEmpty() {


  }
```

```
/**
 * Adds one black bean to this bag.
 */
public void addBlack() {


}

/**
 * Adds one white bean to this bag.
 */
public void addWhite() {


}

/**
 * Removes one bean from this bag, which is assumed to not be empty.
 * If this bag contains both black and white beans, then this method
 * randomly selects the color of the bean returned.
 * @return the color of the bean removed.
 */
public int removeBean() {









}
```

```
  /**
   * Determines whether this bean bag equals the specified bean bag.
   * Two bean bags are equal if they contain the same numbers of black
   * and white beans.
   */
  public boolean equals(Beanbag bag) {



  }

                                                          // declare
                                                          // private
                                                          // fields
                                                          // here
}

public class BeanBagDemo {

  /**
   * Using the class BeanBag defined above,
   * (1) constructs a bean bag with 2 black and 3 white beans.
   * (2) while the bag is not empty,
   *       removes one bean from the bag and
   *       prints the color of the bean removed.
   */
  public static void main(String[] args) {









  }
}
```