

MACS 261J
1st Midterm Exam
February 18, 2011

Name: _____

Question:	1	2	3	4	Total
Points:	10	10	15	15	50
Score:					

Question 1 (10 points)

- (a) [5 points] What is printed by the following program fragment?

```
double degC,degF;  
degC = 100; // at which water at sea level boils  
degF = 9/5*degC + 32;  
degC = degF-32 * 5/9; // hint: 32*5 = 160, 17*9 = 153  
System.out.println("degC = "+degC);  
System.out.println("degF = "+degF);
```

- (b) [5 points] Show how you would fix this program so that it computes and prints the correct (expected) answers.

Question 2 (10 points)

- (a) [5 points] What is printed by the following Java statements?

```
int i = 4;  
while (i>=0) {  
    System.out.println(i%3);  
    --i;  
}
```

- (b) [5 points] Rewrite (simplify) the code fragment above using a for loop.

Question 3..... (15 points)

Complete the following Java methods.

- (a) [5 points] Returns the average of three specified doubles.

```
public static double average(double a, double b, double c) {
```

```
}
```

- (b) [5 points] Returns the smallest of four specified floats.

```
public static float smallest(float a, float b, float c, float d) {
```

```
}
```

- (c) [5 points] Returns `true` if the quadratic equation $ax^2 + bx + c = 0$ has at least one real-valued solution x ; `false`, otherwise.

```
public static boolean hasRealRoot(double a, double b, double c) {
```

```
}
```

Question 4.....(15 points)

(a) [10 points] Implement all methods for the following class:

```
/** A barrel is a cylinder with a height and radius. */
```

```
public class Barrel {
```

```
    /** Constructs an empty barrel with specified height and radius. */
```

```
    public Barrel(double h, double r) {
```

```
    }
```

```
    /** Returns the capacity of this barrel. (The capacity is
```

```
     * the volume of liquid in the barrel when it is full.) */
```

```
    public double getCapacity() {
```

```
    }
```

```
    /** Returns the volume of liquid currently in this barrel. */
```

```
    public double getCurrentVolume() {
```

```
    }
```

```
    /** Attempts to add the specified volume of liquid to this barrel.
```

```
     * Less than the specified volume of liquid will be added if the
```

```
     * barrel becomes full. Returns the actual volume added. */
```

```
    public double addLiquid(double volume) {
```

```
    }
```

```
        // declare private
```

```
        // fields here
```

```
    }
```

- (b) [5 points] This part of the question is about *using* a class. Specifically, *using the methods of the class Barrel defined above*, implement the method `main` for the following class:

```
/**
 * Demonstrates use of the class Barrel.
 * (1) Constructs a barrel with height 1 meter and radius 1/2 meter.
 * (2) Uses the constructed barrel to print its capacity.
 * (3) Adds 1 cubic meter of water to the barrel.
 * (4) Prints the actual volume of water added.
 */
public class BarrelDemo {
    public static void main(String[] args) {

        }
    }
}
```