CSC 211, Section 602
Midterm Exam Solutions
Spring, 2003

Instructor: John Rogers

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1. (10 points) The formula for the volume of a cylinder of height h and radius r is $h\pi r^2$. Write this formula as a Java expression.

   Solution: `h * Math.PI * r * r`.

2. (12 points) Using the answer to the previous question, write a method with the header

   ```
   public double computeCylinderVolume(double h, double r)
   ```

   that returns the volume of a cylinder whose height is `h` and whose radius is `r`.

   Solution:

   ```
   public double computeCylinderVolume(double h, double r) {
       double cylinderVolume = h * Math.PI * r * r;
       return cylinderVolume;
   }
   ```

3. (12 points) Write a method with the header

   ```
   public int computeMedianValue(int a, int b, int c)
   ```

   that returns the median value of the parameters `a`, `b`, and `c`. The median is the middle value of the values. For example, the call `computeMedianValue(15, 10, 20)` would return 15 and the call `computeMedianValue(10, 20, 15)` would also return 15. You may assume that the values of `a`, `b`, and `c` are all different.

   Solution:

   ```
   public int computeMedianValue(int a, int b, int c) {
     if ((b <= a && a <= c) || (c <= a) && (a <= b)) {
       return a;
     }
     else if ((a <= b && b <= c) || (c <= b) && (b <= a)) {
       return b;
     }
     else {
       return c;
     }
   }
   ```

4. (12 points) Write a method with the header

```
public int monus(int a, int b)
```

that returns -1 if a is less than b, 0 if they're equal, and 1 if a is greater than b.

Solution:

```
public int monus(int a, int b) {
  if (a < b) {
    return -1;
  }
  else if (a == b) {
    return 0;
  }
  else {
    return 1;
  }
}
```

5. (12 points) Translate the following mathematical formula into a Java expression.

$$\frac{x^3 + 4x^2 + 24}{y^2 - 45y + 56}$$

Solution: `(x*x*x + 4*x*x + 24) / (y*y - 45*y + 56)`.

6. (12 points) Write a loop that prompts the user for an integer test score and that does not exit until the value entered is between between 0 and 100.

Solution:

```
int testScore;
do {
  String s = JOptionPane.showInputDialog(null, "Please enter a test score");
  testScore = Integer.parseInt(s);
} while (testScore < 0 || testScore > 100);
```

7. (15 points) What is printed by the following program?

```
public class ExampleProgram {
    public static void main(String[] args) {
        int index = 1;
        int product = 1;
        int upper = 6;
        while (index <= upper) {
            System.out.println("product is " + product);
            product = 2*product;
            index++;
        }
        System.out.println("The final product is " + product);
    }
}
```

Solution:

```
product is 1
product is 2
product is 4
product is 8
product is 16
product is 32
The final product is 64
```

8. (15 points) What is printed by the following program?

```
public class ExampleProgram {
    public static void main(String[] args) {
        int index = 0;
        int total = 0;
        int upper = 10;
        while (index <= upper) {
            if (index/2 == index/2.0) {
                System.out.println("index is " + index);
                total += index;
            }
            index++;
        }
        System.out.println("The total is " + total);
    }
}
```

```
index is 0
index is 2
index is 4
index is 6
index is 8
index is 10
The total is 30
```