WIT COMP1000

Exam 2 Review

Format

- The exam will be 5-6 problems, with some problems having multiple sub-questions

- You are allowed a single 8.5x11" piece of paper with whatever notes you want on it

  » Can be handwritten or computer printed

  » You may use both the front and back

- No calculators, books, laptops, phones, or anything besides your single page of notes may be used

Format

- Kinds of questions to expect:
  - » Explain a program or part of a program
  - » Translate between "normal" math expressions and their Java equivalents
  - » Write your own code
  - » Fix incorrect code / find bugs in code
  - » Fill in the blank (in a program)
  - » Short answer

Content

- Everything we've covered so far in the semester, including:

  » Input and output

  » Mathematical expressions (order of operations, integer division, etc)

  » `if-else` statements

  » `while` and `do-while` loops

  » `for` loops

  » Methods

  » Arrays

Review Exercises

- The following slides contain exercises that will help you prepare for the exam

- These exercises are all about writing code to help remind you of the things we've done so far this semester

- Refer back to the exam 1 review slides (and your actual exam) if you need a reminder of the style of questions

Exercise

- Write a program that reads in a series of positive integers and prints out the maximum value entered. The user will indicate they are finished entering numbers by entering zero or a negative integer.

Answer

```java
Scanner input = new Scanner(System.in);
int inputValue;
int max = 0;

System.out.print("Enter positive integers, stopping with zero or a negative number: ");
do {
    inputValue = input.nextInt();
    if(inputValue > max) {
        max = inputValue;
    }
} while(inputValue > 0);

if (max == 0) {
    System.out.println("You didn't enter any positive numbers!");
    System.exit(0);
}
System.out.printf("The max was %d%n", max);
```

Exercise

- Write a program that uses a **for** loop to calculate N!, given N. Ask the user for a value of N and your program should compute and print the value of N! (= 1 * 2 * 3 * ... * N).

Answer

```java
Scanner input = new Scanner(System.in);
int n;
int factorial = 1;

System.out.print("Enter N: ");
n = input.nextInt();
if (n < 0) {
    System.out.println("No factorial for negative numbers!");
    System.exit(0);
}

for (int i = 1; i <= n; i++) {
    factorial = factorial * i;
}

System.out.printf("%d! = %d%n", n, factorial);
```

Exercise

- Write a method that computes the gravitational force between two bodies using the formula: $F = Gm1\,m2/d2$

  » m_1 is the mass of the first body

  » m_2 is the mass of the second body

  » d is the distance between them

  » G is a constant: 6.673×10^{-11} N(m/kg)^2

- Both masses and the distance must be passed as arguments to the method

- Also write a `main()` method to test your method

Answer

```java
public class ClassExamples {

    static final double G = 6.673 * Math.pow(10, -11);

    public static void main(String[] args) {
        double f = gravitationalForce(10000, 10000, 1);
        System.out.printf("Given m1=%.3fkg, m2=%.3fkg, d=%.3fm, then F=%.3fN%n", 10000.0, 10000.0, 1.0, f);
    }

    public static double gravitationalForce(double m1, double m2, double d) {
        double force;
        force = (G * m1 * m2) / (d * d);
        return force;
    }
}
```

Exercise

- Write a program that asks the user for exactly ten integers and then prints them out in the reverse order given. Use an array to store the values so you can print them out after you have read in all ten.

Answer

```java
Scanner input = new Scanner(System.in);
int[] values = new int[10];
int i;

System.out.print("Enter 10 integers: ");
for (i = 0; i < values.length; i++) {
    values[i] = input.nextInt();
}

System.out.println("The values in reverse order: ");
for (i = values.length-1; i >= 0; i--) {
    System.out.println(values[i]);
}
```

Wrap Up

- Review the previous slides and assignments

- Work through all the examples and exercises

- Use the page of notes as a study guide to help you prepare for the exam

- Come see me with any questions or if you need some help understanding anything we've covered so far this semester