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12.5 Problem Set

PART 1:

1. Write the outputs of the following code segments:

for (int i = 1; i <= 3; i++)

for (int j = 1; j <= 3; j++)

System.out.print(j + “ “);

b.

for (int i = 1; i <= 3; i++){

for (int j = 1; j <= 3; j++)

System.out.print(j + “ “);

System.out.println(“”);

}

2. Write code segments that solve the following problems:

a. Output the numbers 1 to 25 in consecutive order, using five rows of five numbers each.

b. Output five rows of five numbers. Each number is the sum of its row position and column position. The position of the first number is (1, 1).

1. Answers:
   1. 1 2 3 1 2 3 1 2 3. Each for loop produces 1-2-3, and that is looped 3 times.
   2. 1 2 3

1 2 3

1 2 3 In this case, there is a newline, creating a 3 by 3 Matrix of sorts, with the numbers from part A

2. Answers:

int i = 0;

for (int x=0; x < 5; x++) {

for(int y = 1; y <= 5; y++) {

System.out.print((i\*5+y) + " ");

}

i++;

System.out.println();

}

This uses the same logic as above, and efficiently breaks a sequence of 25 up by adding 5 newlines

Int i = 0;

for (int x=1; x < 6; x++) {

for(int y = 1; y <= 5; y++) {

System.out.print((i\*5+y)+x + " ");

}

System.out.println();

}

Similarly to the previous problem, this set of nested loops prints out the sequence, but also adds the position, which “shifts” everything by one.

PART 2:

a. while (number > 0)

-1234, -1, 0, 1, 1.1

b. while (0 < number && 100 > number)

-1234, -1, 0, 1.1, 12, 123

A local biologist needs a program to predict population growth. The inputs would be the initial number of organisms, the rate of growth (a real number greater than 0), the number of hours it takes to achieve this rate, and a number of hours during which the population grows. For example, one might start with a population of 500 organisms, a growth rate of 2, and a growth period to achieve this rate of 6 hours. Assuming that none of the organisms die, this would imply that this population would double in size every 6 hours. Thus, after allowing 6 hours for growth, we would have 1000 organisms, and after 12 hours, we would have 2000 organisms. Write a program that takes these inputs and displays a prediction of the total population

Initial number of organisms: -1, 0, 1, 1.123, 1234, 12345

Rate: -1, 0, 1, 1,1, 123, 1234, 12345

Hours: -1, 0, 1, 1.1, 12, 1234, 12345

What would be reasonable test data for a loop that does not execute a fixed number of times?

I would personally use data which is outside the valid condition, inside, and on the extremes. I would also try different data types, to make sure the program doesn’t break.

What is a robust program? Give an example.

A robust program has conditions for “bad data”, or a different data type than what is expected. For example, when you enter strings or negative numbers for the number of pizza’s that you want, a program tells you to pick a valid amount.