

Name: _____

This is Exam #1 in CSMC B113 from Fall 2018.

Students had 80 minutes to complete the exam. Note that this was a **closed-book, closed-notes** exam.

This is being provided purely as an example of a past exam, and is not necessarily indicative of the length, difficulty, format, or set of topics covered on the exam that will be given in Fall 2020.

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Question 1 (15 points)

Part 1. Basic Java Knowledge. Write Java command(s) to do the following:

(1) Define a floating point variable named, **x** _____

(2) Set the variable **x** (from above) to 42.3 _____

(3) Increment the value in **x** by 5.9 _____

(4) Compute the square root of **x** and place it in **x** _____

(5) Convert the value of **x** to an integer and save the result in an integer variable **y**: _____

(6) Convert **theta** (type **double**) from degrees to radians _____

(7) Define an array named **a** of type **double**. _____

(8) Create the array **a** from (7) above to have 100 elements.

(9) Set the element at index 42 in **a** (above) to the value of π . _____

(10) Set the element at index 39 in **a** (above) to a random number between [0..1) _____

Note that there were also five additional questions related to bash commands; those have been removed from this document since bash commands will not be on the Fall 2020 exam.

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Question 2 (10 points) Write Java commands to exchange the contents of two integer variables **x** and **y**.

```
int x = ..., int y = ...;
```

Question 3 (10 points) Write Java commands to create an array named **x** of **N** elements and fill it up with random integers between [10..10000] (inclusive).

Question 4 (10 points) **x** is the same array as in Question 3 above. Study carefully the Java commands shown below:

```
int r = x[0];
for (int i=1; i < x.length; i++) {
    if (x[i] < r) {
        r = x[i];
    }
}
```

(a) How many times will the for-loop be executed? _____

(b) Describe, in one sentence, what the set of commands is computing.

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Question 5 (10 points) Given three integer variables, **x**, **y**, **z** (assume already defined) write Java commands to assign to a variable **max** (you have to define it) the largest value in **x**, **y**, and **z**.

Question 6 (10 points) Here is an algorithm for computing the GCD of two numbers **a** and **b**:

```
while (a ≠ b)
  if a > b
    a ← a - b
  else
    b ← b - a
```

Assuming **a**, and **b** are already defined (as integers), write Java commands to code the above algorithm.

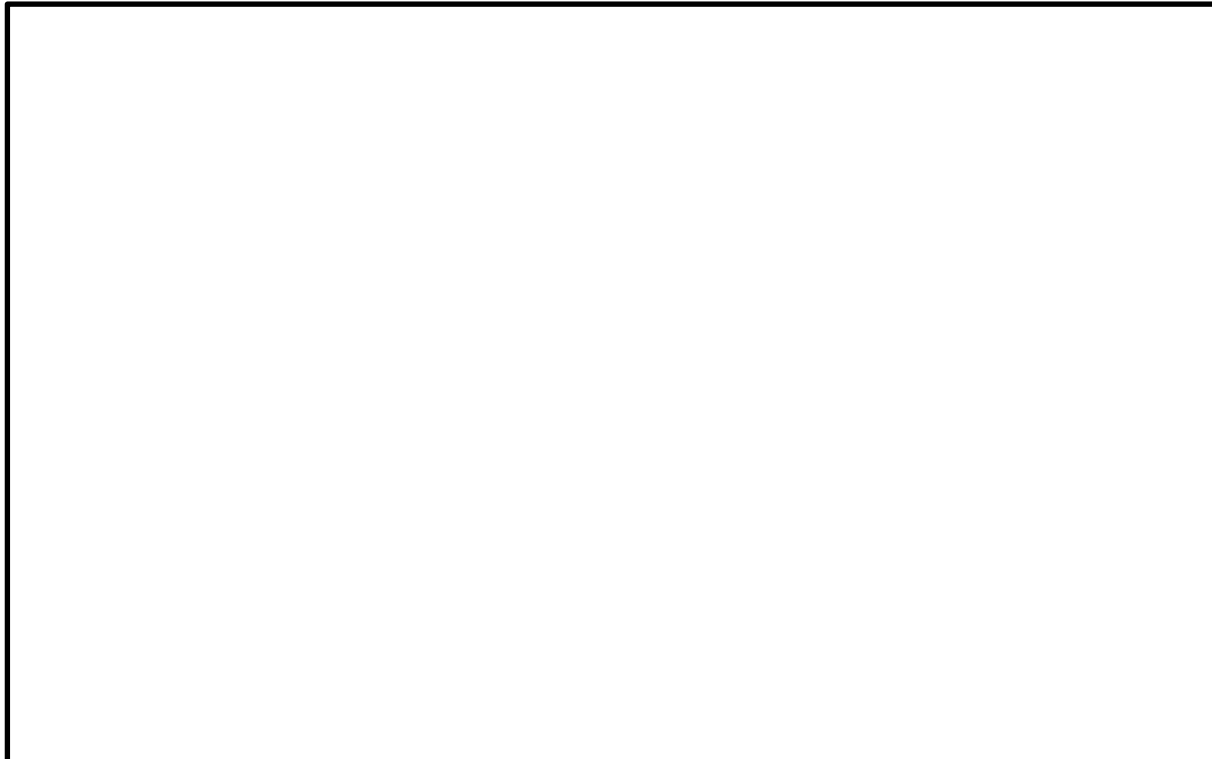
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Question 7 (10 points)

What will be the exact output when the following Java statements are executed:

```
int n = 5;

for (int i=0; i < n; i++) {
    for (int j=i+1; j < n; j++) {
        System.out.println(i + " " + j + " " + (i+j));
    }
}
```



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Question 8 (10 points)

Write a **complete Java program** that displays all odd powers of 3 between 0 and 20 (i.e. 3^i where $0 < i \leq 20$ and i is odd). Output a table (see box) showing the power 3 is being raised to, as well as the result, on each line. You may use a TAB character ('\t') to separate and align the two numbers on each line.

1	3
3	27
5	243
7	2187
...	...

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Question 9 (15 points) Write a complete Java program called **LuckySeven** that simulates the tossing of two six-sided dice and computes the estimated probability of obtaining a sum of 7 on each roll. Your program should input N, the number of trials as an integer from the command line. Here is a sample output:

```
$ java LuckySeven 10000
```

```
The probability of obtaining a 7 in 10000 trials is 17%
```