Name:_____

CSC220 Midterm Exam
October 13th, 2016

Name (print): **Score:**

Directions: *This is an 80-minute, timed, pen-and-paper written exam. No books, no notes, no electronic devices, no headphones, no collaboration. The problems will primarily involve writing Java code or reading and interpreting Java code. Answer all questions in the space provided continuing on the back of page if necessary. Read the directions to each section carefully. During this examination, you are not permitted to use any type of electronic device (including, but not limited to cellular phones, calculators, personal digital assistants, laptop computers, digital watches with calculators, etc.) You may not discuss this test with your classmates during the test. If you have any questions, raise your hand and I will come to you or ask you to come to the front of the room. Note carefully the point values for each question.*

Good Luck!

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Question 1 Circle or write the correct answer for each of the following:

1. Which of the following is **not** one of shape drawing commands in Processing:

```
1. rectangle(…)
2. triangle(…)
3. ellipse(…)
4. point(…)
```

2. What would Processing do as a result of this interaction?

```
ellipse (50, 50, 100, 100);
```

3. What command do you use to create a canvas that has a red background?

4. What is the effect of the Processing statement?

```
void setup() {
    …
    noLoop();
} // setup()
```

5. What is the value of c after the following statements are evaluated?

```
int a = 1, b = 2;
boolean c = (a > b);
```

6. Suppose that the variable `x` currently has the value 20. What is the value of x after the following statements are evaluated?

```
x += 5;
```

7. After the following command, the value of the variable, `s`, is found to be 200. What does that imply?

```
s = height/2;
```

8. What is the result of evaluating `5/2`?

9. What is the result of evaluating `5%2`?

10. What is the result of evaluating `3/11`?

Question 2 Write Processing command(s) to draw a square of side 75 in the center of the screen.

Question 3 Consider the following Processing program fragment:

```
x = 1;
for (int i=0; i < 8; i+=2) {
     x = x * 2;
}
// x = ???
```

What will be the value of x after the execution of the above program?

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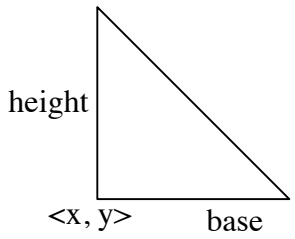
Question 4 Rewrite the following code, using a while-loop instead of a for-loop. The results of executing the two code fragments should be identical.

```
int i = 0, k=0;
while(i<10){
     k++;
     println(k);
     i++;
}
```

Question 5 Write a Processing function called **`rightTriangle`** that, given the **`<x, y>`** coordinates of the lower left corner, the length of the **`base`**, and the **`height`**, draws a right triangle on the screen.



Next, using the function above, write Processing statements to draw 10 right triangles at random <x, y> locations of random height (between 20 and 50), and base (30, 70) within a screen boundary.

Question 6 Write a complete Processing program to implement the following interactive behavior:
A screen of size 500x500 pixels is created with a white background. Whenever the mouse is pressed in the screen, black lines are draw connecting the mouse location with the four corners of the screen.

Question 7 Rewrite the following Java program with better formatting to make it easier to read.

```
public class Test{public static void main(String[] args){
System.out.println("Hello, world!");
}}
```

Question 8 Rewrite the following Java program using a conditional expression.

```
boolean k;
if (a > b && (a - b) >= 2) {
    k = true;
```

```
} else {
      k = false;
}
```

Question 9 Write a complete Java program that uses a for loop to read 5 double values from keyboard (use nextDouble() method of Scanner class). Compute the average of these 5 numbers and print out the result.

Question 10 Write a complete Java program named `Celsius2Fahrenheit.java` that converts a degree from Celsius to Fahrenheit. For example, 100 Celsius is 100*1.8+32 = 212 Fahrenheit. When the program is compiled, if we type "java Celsius2Fahrenheit 100" at command line, the program prints out "100 Celsius is 212 Fahrenheit".

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PROCESSING QUICK REFERENCE

Variables/Constants:
displayHeight, displayWidth, width, height, HALF_PI, PI, QUARTER_PI, TWO_PI

Data Types
boolean, char, int, float, PImage, String

Conversion Functions
int(), float(), degrees(), radians()

Relational and Logical Operators

!= (inequality)	< (less than)	<= (less than or equal to),
== (equality)	> (greater than)	>= (greater than or equal to)
! (logical NOT)	&& (logical AND)	|| (logical OR)

Loops

```
for (init; test; update)
  Statements
}
```

```
while (expression) {
    Statements
 }
```

If-Statement

```
if (test) {
  statements
}
```

```
if (expression) {
    statements
  } else {
    Statements
  }
```

```
if (expression) {
      statements
 } else if (expression){
      …
```

2D Primitives
arc(), ellipse(), line(), point(), quad(), rect(), triangle(), text(), textSize()

Curves
curve(), curveTightness()

Attributes
ellipseMode(), noSmooth(), rectMode(), smooth(), strokeCap(), strokeJoin(), strokeWeight()

Vertex
beginShape(), curveVertex(), endShape(), vertex()

Mouse
mouseClicked(), mouseDragged(), mousePressed(), mouseReleased(), mouseX, mouseY, pmouseX, pmouseY

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Keyboard
keyPressed(), keyReleased(), keyTyped()

PROCESSING QUICK REFERENCE

Text Area Output
print(), println()

Transform
popMatrix(), pushMatrix(), rotate(), scale(), translate()

Setting
background(), clear(), fill(), noFill(), noStroke(), stroke(), color()

Image
PImage, image() loadImage()

Calculation
abs(), ceil(), constrain(), dist(), exp(), floor(), lerp(), log(), mag(), map(), max(), min(), norm(), pow(), round(), sq(), sqrt()

Trigonometry
acos(), asin(), atan(), atan2(), cos(), sin(), tan()

Random
random(), noise()