NAME: ____________________________

DO NOT FORGET SEMICOLONS AT THE END OF STATEMENTS!

1. (30 pts) Short answer (only a few words). Be clear and not vague!
   a. Unlike NetLogo, Processing requires that you declare what about each variable you are going to use?
   b. What feature of Processing allowed us to have an indexable list of many copies of the same type of thing?
   c. What is the name of the function used to initialize a Processing program?
   d. What is the name of the function used to repeatedly display a set of graphics by executing the function at a specific frame rate?
   e. In default mode, does Y get larger or smaller as you go toward the top of the window?
   f. What variable contains how wide the screen is?

2. (10 pts)
   All through the semester we did iterative development of our programs. This meant we started with the simplest working program and with careful planning and thought (think), we added small features (edit) and tested them (test) always keeping the program running until it did what we wanted. Random editing does not work. What three things do we do over and over and over in iterative development? I think it is important that you remember this approach when you write code so to get credit simply WRITE THE ANSWER 3 TIMES. (HINT: the answer is “think, edit, test”)

3. (10 pts)
   One thing I tried to emphasize again and again was: to learn how to program or master any skill, you must spend time doing what two things? To get credit WRITE THE ANSWER 3 TIMES. (HINT: answer is the 2 P’s: “play and practice”. Play means try new things. Practice means practice old things.)

4. (50 pts)
   a. Write a statement that declares the variables \( x \), \( y \), and \( z \) to be floating point numbers.
   b. Write a statement that declares the variables \( a \) and \( b \) to be an integer.
c. Write a statement that will set the color of the outlines of rectangles to white.

d. Write a statement that assigns to $x$ the value of the remainder when $y$ is divided by 10.

e. Assuming you are in RGB mode, write an expression that gives the color green. That is, it has no blue or red and green is completely “on”. The result you generate must be of type color.

f. Write a statement that creates a window to draw in that is 355 pixels in the $x$ direction and 113 pixels in the $y$ direction.

g. Write a statement that sets the color scheme to HSB rather than RGB.

h. Write a statement that will set the frame rate to once per second?

i. Write a statement that will draw a line from the point $(10, 20)$ to the point $(30, 40)$?

j. What statement will set the thickness of a line to 5 pixels like we did for the hour hand in the clock we did in class?

5. (50 pts)

a. Give the statements that draw a circle of radius 10 at location $x = 100, y = 200$ and the interior color is white and there is no outline of the circle. HINT: beware the radius.

b. What are the statements that draw a rectangle at $x=100, y=200$ and size in the $x$ direction of 10 and $y$ direction of 20 and no interior coloring and the outline is the color that is stored in the variable Orange. That is Orange is of type color.
c. Give the FULL CODE for the setup routine that just sets the background to black only.

d. Given that we know that 212 degrees Fahrenheit is 100 degrees Celsius and 32 degrees Fahrenheit is 0 degrees Celsius, use `map` to give an expression that will convert the temperature $T$ in Celsius to degrees Fahrenheit. (Hint: beware which way you are converting!)

e. $x = 0$;
   while ($x^2 < 20$) {
      $x++$;
   }
   what is the value of $x$ after this code? (Hint: value of $x$ not $x * x$.)

6. (30 pts)
   a. Write the statements that will set $x$ to 2.7 if $y$ is less than 10 and set $x$ to 3.1 otherwise.

   b. Write the statements that will declare $w$ to be an array of Boolean values, allocate 211 values in the array, then assign all the array elements to true except the very first one which should be set to false.

7. (20 pts) Here it is, as promised: Write the procedure `pline` that takes four floats: $x$, $y$, angle, len. It should then draw a line of length len at angle degrees from point $(x, y)$. Write the full procedure. (HINT: beware this is in degrees!)

It was great to have you in class. Have a fabulous break!