



3. (3 points) What are the values of  $x$ ,  $y$  and  $z$  at the end of each of the following code blocks? Ignore any variables that do not appear in a code block.

a.	<pre>float x,y,z;  x = sqrt(5); y = sqrt(5); z = x*y;</pre>	b.	<pre>int i,n; float x,y,z;  i = 5; n = i/2; x = n; y = i/2.0; z = float(i)/2;</pre>	c.	<pre>float a,b,w,x,y,z;  a = 9; b = 3; w = log(a); x = log(b); y = w/x; z = exp(y)</pre>
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4. (5 points) The resistance of a photoresistor can be modeled as

$$R = c_1 L^{c_2}$$

where  $R$  is the resistance of the photoresistor in ohm,  $L$  is the light intensity in Lux, and  $c_1$  and  $c_2$  are constants.

- Use algebra to rearrange the preceding equation to obtain a formula for  $L = f(c_1, c_2, R)$ .
  - Write an Arduino program to evaluate  $L$  for  $c_1 = 1680$ ,  $c_2 = 1.08$ . Write the Arduino code to evaluate  $L$  for  $R = 0.95 \text{ k}\Omega$  and print the value of  $R$ . Your solution should involve definitions for the variables,  $c_1$ ,  $c_2$ ,  $R$  and  $L$ . In other words, define Arduino variables for all symbols that appear in the equation for  $L = f(c_1, c_2, R)$ .
5. (5 points) Build the breadboard circuit and write an Arduino program that uses a potentiometer to change the rate of blinking of an LED. The wiper pin of the potentiometer is connected to an analog input pin. On each pass through the `loop` function, the code should
- Read and store the voltage at the potentiometer wiper.
  - Turn on an LED.
  - Wait a number of milliseconds equal to the reading of the potentiometer voltage. (Use the raw reading on the 10-bit scale returned by `analogRead`.)
  - Turn off the LED.
  - Wait a number of milliseconds equal to the reading of the potentiometer.

What is the maximum possible duration that the LED is on? Write a second version of the code so that the LED is on for a minimum of 0.1 seconds and a maximum of 3 seconds. In other words, the extreme positions of the potentiometer correspond to blink half-cycles of 0.1 seconds and 3 seconds. Include printouts of both versions of the code and a sketch of the electrical circuit.