Group Assignment

1. Assemble an electrical power system that uses *your own* 12 VDC power supply and switches to control the power to your fish tank. The components you will need are
   - 12 VDC and 2A power supply
   - Female barrel jack
   - Power switch for 12VDC pump circuit
   - Power switch for Arduino controls

   For this homework assignment, you need to have assembled all the components. The power system with switches for two circuits does not need to be fully functional, although there is no reason to delay. *Do not assume* you can use the DC power supplies from the lab.

2. Assemble the voltage divider circuit for the salinity sensor on the long breadboard. Power to the voltage divider is supplied by a digital output. Output from the voltage divider is wired to an analog input. One person on the team will use their Arduino for the group fish tank. That person will have their Arduino attached to the acrylic base plate. That person will use the Arduino and acrylic base plate in their solution to the remaining problems.

Individual Assignment

Turn in a cleanly formatted version of the code, and a sample print-out of at least 10 readings. HINT: Use the "Auto Format" function in the "Tools" menu

1. Write an Arduino program to measure the output of the salinity sensor. Use a photoresistor instead of the salinity sensor to debug the program. Your program should perform the following steps in a continuously repeating loop:
   a. Turn on the sensor by setting the digital output pin `HIGH`.
   b. Wait 100 milliseconds
   c. Make `n` readings of the sensor, where *n* is a variable. For testing, use `n` =15.
   d. Turn off the sensor
   e. Average the readings
   f. Convert the average value to voltage
   g. Print the time and voltage value to the Serial Monitor.
   h. Wait 100 milliseconds

2. Convert the code developed above so that the sensor reading occurs in a separate function, not in the `loop()` function. Your function should have three input values and one return value. The inputs are `power_pin`, the number of the digital output pin that supplies power to the voltage divider, `reading_pin`, the number of the analog input pin, and `n` the number of readings to average. Your function should look something like the following code.

```
float read_sensor (int power_pin, int sensor_pin, int n) {

   int wait_reading=100;
   float reading;    // There are more variables to declare


   // turn on power to the voltage divider and wait


   // Make n readings and average them


   // Turn off the sensor


   return (reading);
}
```

Complete the assignment by filling in the missing code. Your code should be properly indented, i.e. not left justified. Note that a working code will need you to call your function inside the `loop()` function:

```
void loop() {
   // declare variables
   int nave=15, salinity_sensor_pin = 3;    //  You choose these values
   float value;

   value = read_sensor(salinity_power_pin, salinity_sensor_pin, nave);
   Serial.println (value);
}
```

Note that `sensor_power_pin` needs to be a global variable shared by the `setup()` and `loop()` function. However, `power_pin` is a local variable in the `read_salinity` function and does not need to be (and should not be) the same global variable shared by `setup()` and `loop()`. The (better) solution is to have the code in loop() pass the variable since the `pinMode()` is set in the `setup()` function. The image on the next page shows how these variables work.

```
                        int salinity_power_pin = ... ;                Global variable shared
                                                                      by setup and loop
                        setup() {
                           pinMode(salinity_power_pin,OUTPUT);

                        }

                        loop() {
    salinity_sensor_pin      int salinity_sensor_pin = ...;
    is not global
                             value = read_sensor(salinity_power_pin,salinity_sensor_pin,nave);

                                          Pass the value              Pass the value
                        }                 of the global variable      of the local
                                                                      variable in loop
                        float read_sensor(int power_pin, int sensor_pin, int nave) {

                        }
```