Week 5 Exercises to be reviewed on October 6

In this exercise we will create a program that does 3 calculations for the user, the area of a circle based on its radius, the distance between two x,y coordinates, and the maximum value in a list of numbers. First set up your functions to accomplish each calculation, then add a menu to allow the user to choose which calculation they would like to do, followed by a prompt for the input of the numbers or lists to use for the calculation.

1. Create a program with a function that calculates the area of a circle by taking a radius from the user. The formula is:

$$Area = \pi r^2$$

   - We could use 3.14159 for pi, but lets import the math module and use the "pi constant" instead.
     ```
     import math #place at the top of your code
     math.pi #returns 3.14159…
     ```
   - To square a number, we raise it the 2nd power. To raise a number to any power in python we use the ** operator. For example >>> `x**4` == x^4

2. Add a function that takes two points p1 and p2 **as two element lists** and returns the distance between two points on the x-y coordinate system (x_1,y_1) and (x_2,y_2). The formula is:

$$distance = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

You may use the following code to guide the algorightm, but make sure to change the parameters of distance() from 4 separate values, to two lists each with two elements representing the x and y of that point. You can then access the values of each point with the list[n] notation. *Example* p1 = [3,2] -> p1[0] returns 3

Also try to condense a few of the lines of code into multiple statements on fewer lines.

```
def distance(x1,y1,x2,y2):
  # distance = sqrt( (x2 - x1)^2 + (y2 - y1)^2 )
  # Find the difference between x2 and x1
  dx = x2 - x1
  # Find the difference between y2 and y1
  dy = y2 - y1
  # Square each of the differences
  dx = dx**2
```

```
  dy = dy**2
  # Add those differences
  ds = dx + dy
  # Return the distance
  return ds**.5

# Can we do this with less lines of code?
```

3. Add a function that finds the maximum number in a list of numbers and returns it. Make sure to name it something other than "max".
4. Add a menu that asks the user to select a function, then take their input and produce an output and keep going until they decide to exit.

Guiding comments

```
# define a function that takes a radius and returns the area of the
circle with that radius
          # square the radius
          # calculate the area A = pi * r^2
          # return the area
          # could we do this in one line of code?

# define a function that takes in two points (each one as list with
two elements) and returns the distance between those points
def distance(p1,p2): # where p1 is [x1, y1] and p2 is [x2, y2]
          # Find the difference between x2 and x1
          # Find the difference between y2 and y1
          # Square each of the differences
          # Add those differences
          # Take the square root of that sum (raise to .5 power)
          # Return the distance

# define a function that takes a list of points and returns the
maximum number in that list
          # create a variable 'max' and set it to the first element
of the list
          # iterate through the list
                  # if the current number is greater than max
                          # set that number to max
          # at the end of iteration, return max
```