Python Exercises

Tuple:

1.
    a. Create 3 variables var_1, var_2 and var_3 giving them the values 1, 2 and 3 respectively using only a single line of code in python.
    b. Change the value of var_1 and var_2 such that var_1= var_2 and var_2= var_1. print the values to verify that now var_1=2 and var_2=1.
       (hint: you might need temporary variables)
    c. In most programming languages you need temporary variables for handling variables "switches" such as in b, but python offers a way to do this without!
       try changing the code in b to
       var_1, var_2 = var_2, var_1
       and verify that this method also work.
2. Ash Ketchum has been out capturing Pokémon again. He first got a Pikachu, then Pidgey, then Abra, then Pidgey, then Eevee then Pidgey
    a. Make a tuple called "captured", with the captured Pokémon (make sure to keep the order they were captured in)
    b. Would it have been favorable to use a list instead of tuple in this case? What are the pros and cons?
    c. Ash's memory is not as it used to be, he is wondering if there might be multiple pidgeys from the captured

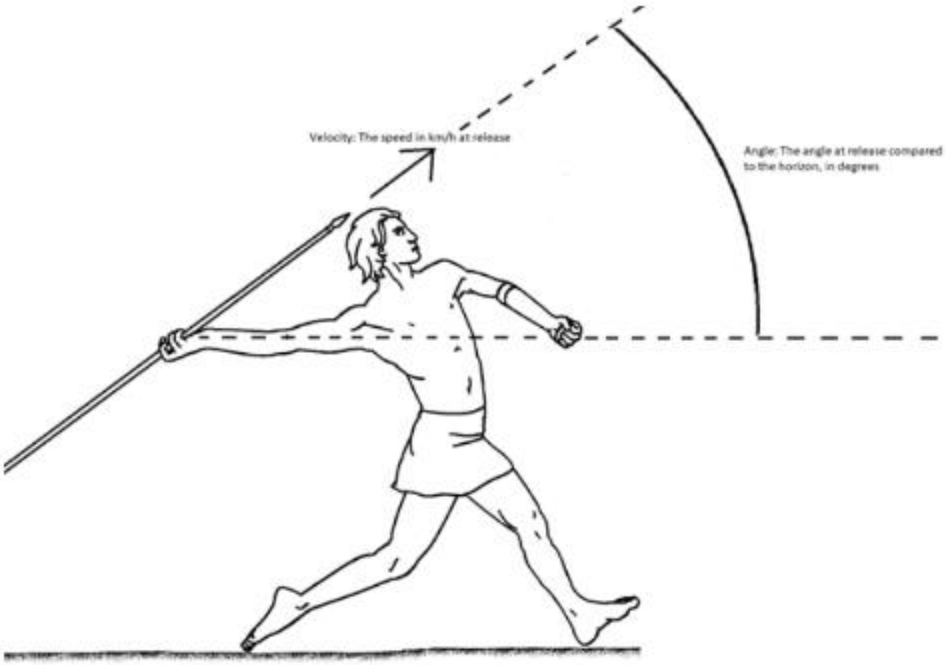
tuple. Use the count method and print the number of pidgeys in the list.

Set:

d. Since Ash’s memory is going bad, Help him and create a program that takes a user input (using the python input operator), where the user can type a Pokémon name and then the program should print out if the Pokémon is already in the captured tuple or not. also print the total number of Pokémon in the captured tuple, as well as the number of unique Pokémon.

Numpy:

3. Go back to exercise ex3_numb_input question 3, and copy the code from my_throw.py and save it as my_multi_throw.py.
   a. Change the code such that it can calculate multiple throw length based on a numpy array of angles and velocities.
   b. Install scipy using
      pip install scipy


Velocity: The speed in km/h at release
Angle: The angle at release compared to the horizon, in degrees

After some testing of the Olympic athlete javelin thrower Andreas Thorkildsen in 2008, it turns out that his throw velocity follows and can be simulated using the following distribution:
stats.weibull_max.rvs(2,loc=107, scale=4, size=n),
while his angle can be simulated using the following distribution:
stats.norm.rvs(loc=48, scale=7, size=n)
where n is the number of simulated values. (the functions above returns a numpy array).
simulate 1000 throws and calculate each throw length.

c. Go back to exercise ex5_list.docx and copy the solution-code from question 3.
and use the code to calculate a 95% numerical

confidence interval (alpha=2.5) for a random throw from Andreas Thorkildsen.

d. **EXTRA** Exercise:

In a competition there are 6 throws but only the longest throw matters.

generate 6000 velocities and angles and reorder them into a 2d-array which shape 1000x6 using the reshape method.

again, use the math above and calculate the length of the 6000 throw length.

afterward use the np.max function with the axis input and calculate each row max (the max length within each game), hench you should now have a simulated longest length throw for 6000 games.

What is now the 95% numerical confidence interval of the winning length?