Python Exercises

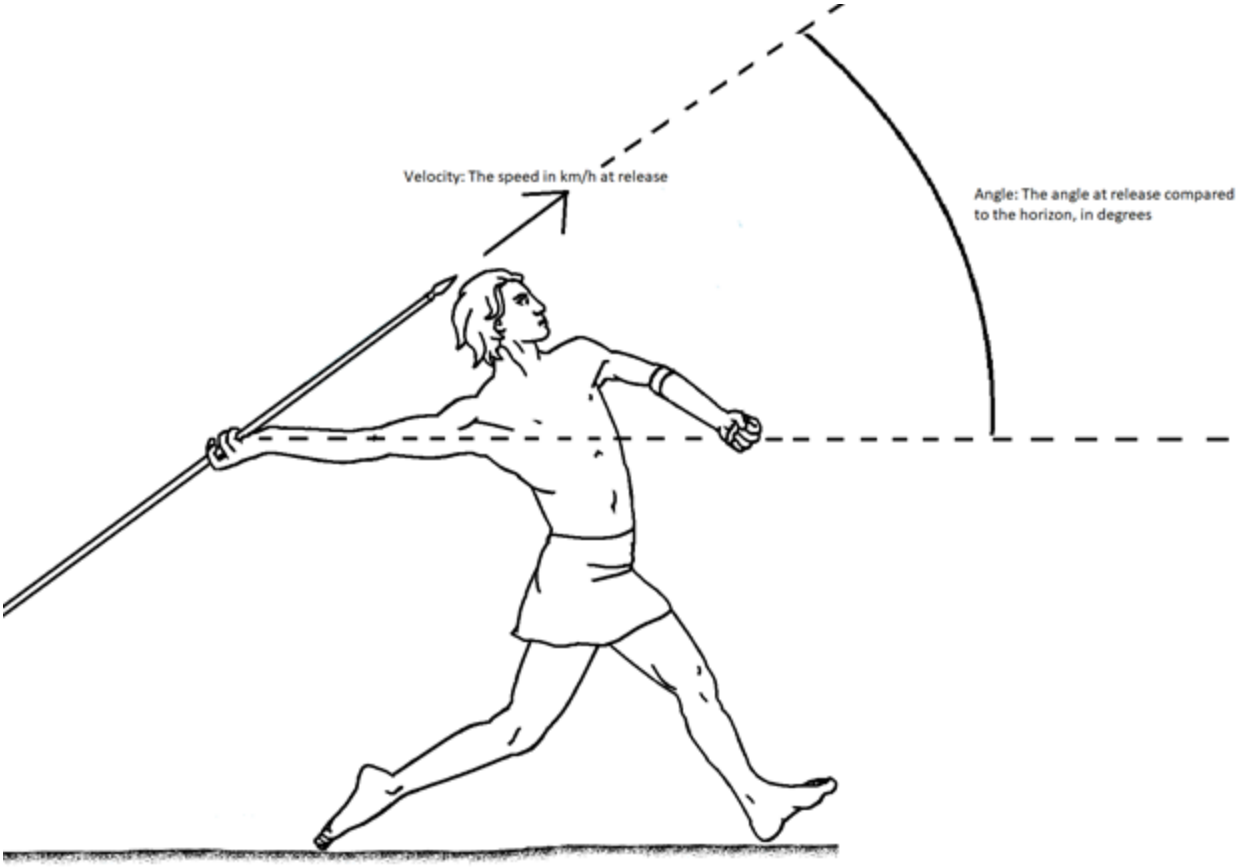
Loops:

1. Go back to exercise 2 ex_7_functions.docx (the "bart_cheat_code").
    a. Change the logic such that the code still creates a repeating string, but do it using a while loop.
    Call the function "bart_cheat_code_while".
    hint: create the code first, than encapsulate it in a function.
    b. Do the same as above, but use a for-loop and call the function "bart_cheat_code_for"
2. Write a code for the game of guessing the number someone is thinking of. The task is completed when:
    a. Takes a target number as input by a user and save it in a variable.
    b. Take another input, number of allowed wrong guesses.
    c. Clear the terminal such that the person guessing cannot see the target number.
    d. The user should try to guess the number, and after each guess the algorithm should print the number of tries left, as well as the information if the guess is too large or small.
    e. The code should stop when the person guesses the number, or the total number of tries reaches the limit.
    Print a suitable message for each of the two cases.

3. Do the common FizzBuzz interview challenge. As this is a popular interview challenge this has been solved a bunch of times online, DON'T fall for the temptation and go straight to the solution!
   The challenge goes as follow:
   Write a code that prints the integer 1 to 100, but if the number is dividable by 3 print "Fizz", if the number is dividable by 5 print "Buzz", and if the number is dividable by both 5 and 3 print "FizzBuzz". Dividable is defined as giving 0 in rest. Hence the result should look like this:
   1, 2, Fizz, 4, Buzz, Fizz, 7, …,14, FizzBuzz, 16, …
   Hint: The modulo operator "%" might be useful.
4. The year is 2008, right before the start of the Beijing summer Olympics.
   Andreas Thorkildsen and Tero Pitkamaki are the favorites for the javelin competition.
   While practicing running up to the Olympics, they were both carefully measuring their performance by throw velocity and throw angle (see image below):

```
import scipy.stats as stats
# Thorkildsen single throw velocity and angle:
thorkildsen _velocity = stats.weibull_max.rvs(2, loc=107, scale=4, size=1)[0]
thorkildsen _angle = stats.norm.rvs(48, 7, 1)[0]

# Pitkamaki single throw velocity and angle:
pitkamaki _velocity = stats.weibull_max.rvs(2, loc=106.5, scale=3, size=1)[0]
pitkamaki _angle = stats.norm.rvs(45.5, 4, 1)[0]
```



By testing hundreds of athletes, it turns out that throw velocity follows a Weibull distribution, while the angle follows a normal distribution.

Using the velocity and angle data obtained running up to the Olympics each of the distribution for Thorkildsen and Pitkamaki can be estimated by:

Using the distributions above, “throw_distance” and

“quantile” functions from ex_7_functions.docx exercise 4 and 5:

a. Create the functions “thorkildsen_throw()” and “pitkamaki_throw()”, which takes no inputs and returns a single throw distance for each of the athletes-functions.
b. In javelin competition you only care about the longest of 6 throws. Write a “thorkildsen_competion_best(numb_throw=6)” and “pitkamaki_competion_best(numb_throw=6)” that takes one input, number of throw which default to 6 and return the best of those throws using the functions in question a)
c. Using a for loop, simulate 1000 competition for both Thorkildsen and Pitkamaki. And collect their results in a list “thorkildsen_results” and “pitkamaki_results”.
   extra:
   Get a visualization of the two distribution for longest throw in a competition using a histogram plot (we have not learned about this yet, but if you interested “pip install matplotlib”, and follow this histogram tutorial https://pythonspot.com/matplotlib-histogram/)
   and plot both of their competition throw histogram in a single figure.
d. Using the simulation above, what is the sample probability of Thorkildsen winning

over Pitkamaki? Loop through the two competition lists and compare the result of one and one pair. How many would Thorkildsen win, and how many would Pitkamaki?

e. Using the “quantile” functions from ex_7_functions.docx what is the 95% confidence interval (alpha=0.05) for their winning throw length?
f. In a hypothetical alternative world, each competition consists of 18 throws instead of 6. Do c, d, and e again for this alternative world. If you where guessing who would win, would your guess change in this scenario?