HOMEWORK 3

CS 125

due at 12:45am (classtime) on Thursday, September 3

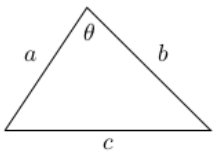
Write a Python program to solve each of the following problems. You may either compose and test your solutions in the ActiveCode boxes on the Runestone site, or using Python installed locally on your computer.

When you have finished your solutions, copy and paste all of them into a single Python file (or text document). Use comments (lines that begin with a # symbol) to clearly state the problem number for each solution in your file. Save your file and upload it to the Homework 3 assignment on Moodle.

1. **Sum of random numbers:** Use a loop to print ten random floating-point numbers, each between 0 and 1. Also compute and print the sum of these numbers.
2. **Law of cosines:** Write a program that computes the length of the third side of a triangle, when the lengths of two sides and the angle between them are known. To do this, use the law of cosines:

   $$c = \sqrt{a^2 + b^2 - 2ab\cos(\theta)},$$

   In the formula, a and b are the lengths of the known sides, θ is the angle between them, and c is the length of the unknown side. Your program should ask the user for a, b, and θ, and then print the value of c.

3. **Approximating *e*:** Write a program that approximates the number e using the formula

   $$e \approx \sum_{k=0}^{n} \frac{1}{k!} = \frac{1}{1} + \frac{1}{1} + \frac{1}{1 \cdot 2} + \frac{1}{1 \cdot 2 \cdot 3} + \cdots + \frac{1}{1 \cdot 2 \cdots n}$$

   Your program should ask the user for an integer n, compute the approximation of e using the formula above, and output the result. (Note that the formula has $n + 1$ terms, indexed $k = 0$ to $k = n$.)

4. **Random polygon:** Write a program that generates a random integer n between 2 and 20, and then uses a turtle to draw a polygon with n sides.