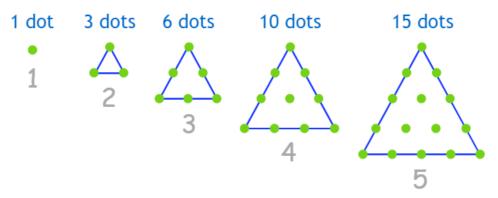
COSC 311 Homework 1 (10 points)

Due Wednesday, 15 February 2023 at 11:59 PM

Please finish the following problems and submit your homework report via MyClasses. Your submission must be a PDF document. For each problem, please 1) copy and paste your python source code into the report (do not use screenshot); 2) include all the test results of your program (may use screenshot).

1. Triangular Number Sequence (2.5 points)

The Triangular Number Sequence is generated from a pattern of dots that form a triangle. By adding another row of dots and counting all the dots we can find the next number of the sequence (https://www.mathsisfun.com/numberpatterns.html):

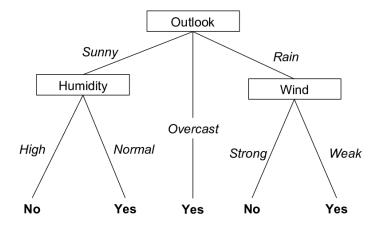


Thus, the Triangular Number Sequence is 1, 3, 6, 10, 15, 21, 28, 36, 45, ...

- 1) Write a program to:
- Print out the first 20 numbers of the Triangular Number Sequence
- Calculate and output the sum of even numbers and sum of odd numbers, respectively, in the first 20 numbers
- 2) Test your code

2. Construct Decision Tree Model Using If-Statement (2.5 points)

- 1) Write a program to:
- Define a function to take three inputs (outlook, humidity, and wind). It uses a nested if-statement to express the following decision tree model. This function returns either True or False to indicate whether a user will play tennis or not.



- In the main function, ask user input the values for outlook, humidity, and wind, respectively; call the above function to get result, then output whether the user should play tennis or not.

2) Test your program using the following samples:

Outlook	Humidity	Wind
Sunny	High	Weak
Overcast	Normal	Strong
Rain	High	Strong

3. Draw an octagon (2.5 points)

- 1) Write a program to:
- Define a function to take a side length, L, as input. It draws an octagon of length L using asterisks (*). For example, if the L=5, it will draw an octagon as follows:



- In the main function, ask user input the side length; you need to do input validation check so that the input side length must be greater or equal to 2 (otherwise, ask user input again till it is valid)
- 2) Test your program using at least 3 different side length inputs.

4. Monte Carlo Simulation (2.5 points)

If we roll two fair dice, there are 11 possible values, as shown in the following figure (left):



Total	Probability	
2	2.78%	
3	5.56%	
4	8.33%	
5	11.11%	
6	13.89%	
7	16.67%	
8	13.89%	
9	11.11%	
10	8.33%	
11	5.56%	
12	2.78%	

- 1) Write a program to roll the two dice \mathbf{n} times, then calculate the probability for each value, as shown in the above figure (right). Keep 2 digits after the decimal point for the probability results.
- 2) Test your program using $\mathbf{n} = \mathbf{100}$ and $\mathbf{n} = \mathbf{100,000}$ respectively, and show the probability for each value.

Policy

- 1. Each student MUST finish this homework independently. NO TEAM WORK and DISCUSSION are allowed.
- 2. If you need any help, please feel free to contact the instructor.