

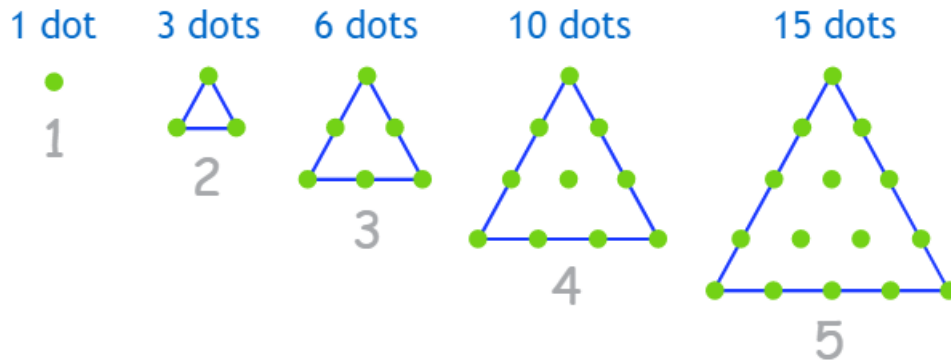
COSC 311 Homework 1 (10 points)

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.

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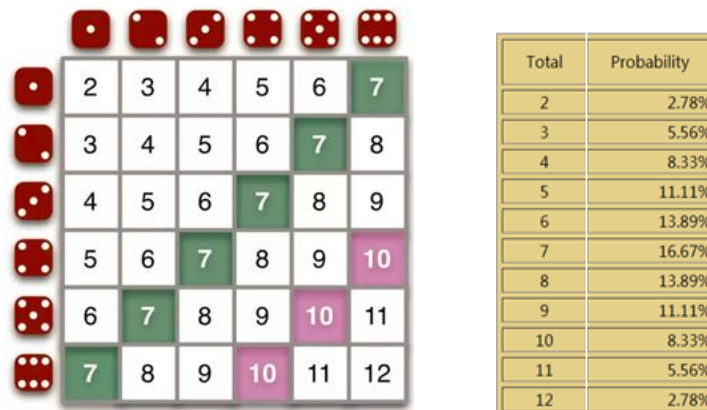
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- In the main function, ask user input the side length; you need to do input validation check so that the input side length must be greater or equal to 2 (otherwise, ask user input again till it is valid)

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):



1) Write a program to roll the two dice **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 **n = 100** and **n = 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.