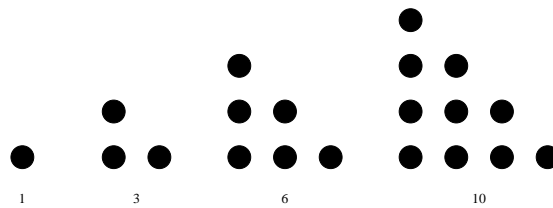


Beginning C Programming for Engineers

Homework Set 3

Name: _____

1. The sequence $T_n = \sum_{i=1}^n i$ where n is a positive integer, generates the so-called *triangular numbers*, for reasons made clear in this figure of the first 4 triangular numbers.



We would like a program that reads an integer n as input, then determines and prints T_n .

- (a) Draw a flowchart illustrating an algorithm to compute a triangular number, using iteration. (It should only print the final answer, not the spots like in the picture! For example, if n is 3, just print out T_3 , which is 6, not the 6 dots.) Is there a control variable in your flowchart?
 - (b) Write a C program that implements your algorithm, using a `for` statement.
2. Write a program that lets you play the “High/Low” game.

The program should choose a number between 1 and 1000, inclusive, but not tell you what its number is. This is the “computer’s number”.

The program should then prompt you to guess the computer’s number.. After you type in each guess, the computer will indicate if your guess was too high, too low, or correct. If your guess was not correct, the program should allow you to continue guessing. Note that the computer’s number should not change throughout the game!

- (a) Draw a flowchart illustrating your algorithm.
- (b) Is there a control variable? Justify your answer. Which statement would be more appropriate for implementing the loop, `for` or `while`?
- (c) Write a C program to implement your algorithm. Test your program a few times.
- (d) *Optional:* Can you figure out a strategy for you to guess the computer’s number within 10 tries? Can you turn this strategy into an algorithm?
- (e) *Optional:* Can you design a program that would allow the computer to guess a number that *you* have chosen in the range $[1, 1000]$? If your program is systematic, it should be able to determine your number within 10 guesses.