Definitions

1. Complexity:
    a. Big O- Tight upper bound. Better than or equal to this in the worst case.
    b. Big Theta- Bound within a constant. This is the exact efficiency.
    c. Big Omega- lower bound. It's this at best case.
    d. Order of growth - unaffected by constants. Normally defined by a big O.
    e. Recurrence Relation - A recurrence relation is **an equation that defines a sequence based on a rule that gives the next term as a function of the previous term(s)**
    . for some function f. One such example is xn+1=2−xn/2. for some function f with two inputs.
    f. Telescoping - take a large number of terms to a small constant number of terms
2. Dynamic Programming - To make brute force recursive algorithms more efficient:
    a. Memoization - improve recursion by storing results in a table full of -1s. Can increase effiency in space and time, but not always. Time and space efficiency are NOT always the same.
    b. Tabulation - calculate the results from the bottom up. Something is tabulated if it uses the previous calculation to make the next calculation in ANY way. no recursion used! - requires recursive thinking, but not recursive code.
3. Types of Algorithms
    - Brute Force algorithm - do all the work the longest way. By checking all answers.
    - Greedy algorithm - go for largest or smallest of something.
    - Recursive algorithm - defined in terms of itself
    - Divide & Conquer algorithm - call children to do work.

- Dynamic programming algorithm

4. **Graphs:**
    - **Graph** - vertices and edges
    - **cyclical** - it’s possible to get back to an origin point through other vertices.
    - **loop:** start at a point, end at the same point
    - **complete graph:** on 5 vertices can be shorthanded to K4. This is the most dense graph and the most dense simple graph
    - **a simple graph** - no loops or double edges
    - **tree:** connected acyclical graph
    - Also tree: the number of edges is one less than the number of vertices → e = v-1 and v = e + 1
    - **A minimal spanning tree (MST)** tries to find the lowest “cost” path to connect all vertices of a
      simple weighted graph.
    - Degree of a vertex is the number of edges connecting to that vertex
    - Connected graph: a path between every pair of vertices
    - complete graph → every point attaches to every other point directly.