CST 370 – Homework 2
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1.a) This is not a graph. To start, since there is an absence of arrows on the edges, this is an undirected graph. By definition, undirected graphs cannot have duplicate edges which this graph does have (between vertices a and e).

b) True, this is a graph. In this directed graph, each node is unique and each edge is also unique in the sense that there are no duplicate edges that move in the same direction. The two edges between ‘b’ and ‘e’ are not duplicates because they point in opposite directions (b → e, e → b).

2.a) We can use the very efficient binary search algorithm to find our number when we use an array.

b) We have to traverse the whole list no matter which way we start. The plus side of using the linked list is that unsuccessful searches are faster.

3. The bold letter is the head of the link in the list and the arrow points to the next link:

A → C
B → A → C
C → D
D → C
E → F
F

4. The maximum amount of edges for a binary tree with six vertices is 5 edges. We arrive at this solution via the equation E = V – 1 where E and V are absolute values, E = edge, and V = vertex.

5.a) You. n*logn is faster than n^2.

b) Classmate. Constant time is the fastest of all big O notations

6.a) There are <, <, >, +, and return operations in this algorithm. Out of all of these operations, the < operator on **line 4** should be considered as the basic operation. However, the other < and > as well as the + operators also execute each time the loop iterates so any of those operators on lines 5, 7, and 9 could also be the basic operation in a large array.

b) The time complexity of this algorithm is **n** because the loop executes for n + 1 times.

7.a) The sum of all squares up to the inputted number.

b) The basic operation can be either the for loop on line 4, the * operation on line 5, the + operator on line 6, or the return operation on line 7. Out of these, we’ll consider the for loop (**line 4)** as the basic operation.

c) Time complexity would be O(n).