Background Survey for COMP/MATH 3804

This is a survey in order to determine the general amount of background knowledge in the class. It is **intended to help you**.

Answer the following questions in a class discussion.

(a) How fast can n numbers be sorted using comparisons?

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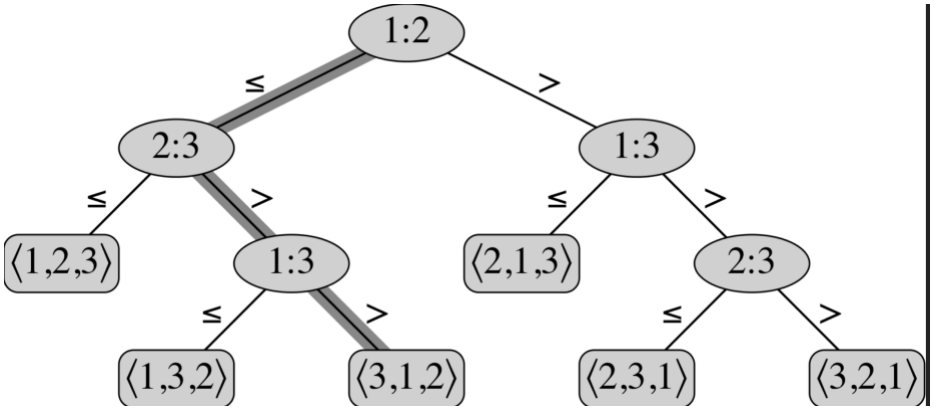
O(n log n)



(b) How fast can a given integer be found in a sorted array of n integers?

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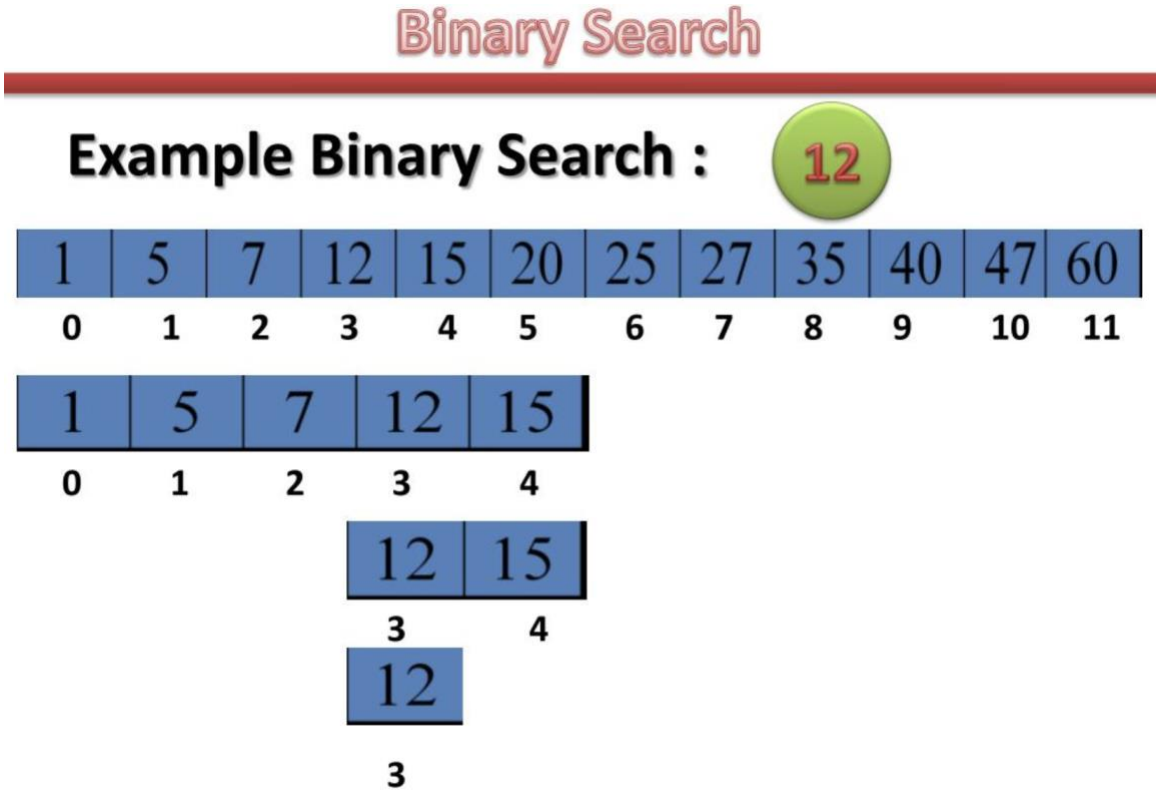
O(log n)



(c) How fast can a given integer be found in a linked-list of n integers?

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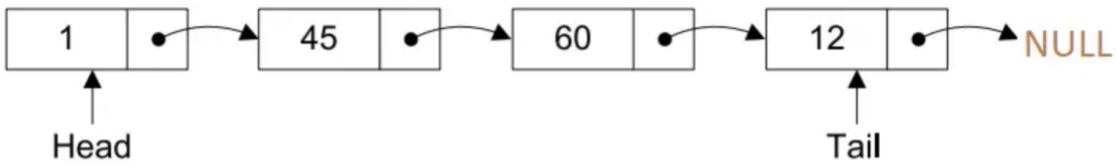
O(n)



Single Linked list populated with integer

(d) How fast can an element be popped from a stack of size n?

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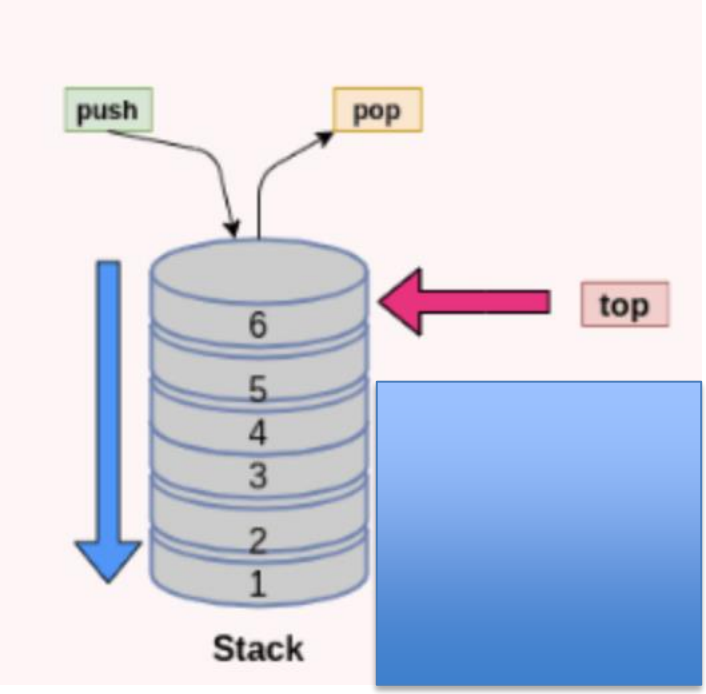
O(1)



(e) How fast can an element be dequeued from a queue of size n?

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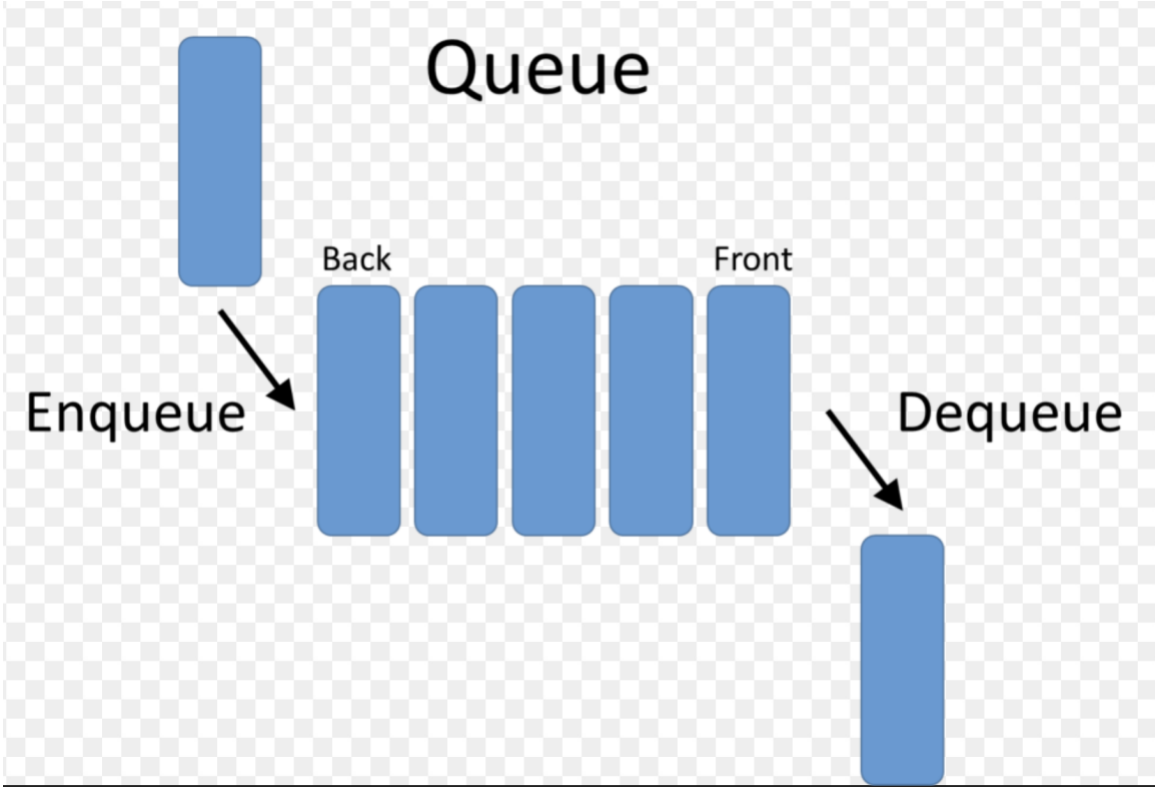
O(1)



(f) How many subsets are there of a set of n elements?

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2^n

Set {1, 2, 3, 4, 5}

Subset example {5, 2 , 3}

Bit representation:

1 2 3 4 5

[0, 1, 1, 0, 1]

0: not present in subset 1: present in subset

(g) How many subsets of size 3 are there of a set of $n \geq 3$ elements?

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$$\binom{n}{3}$$

n choose 3

(h) What is $\log_2 256$?

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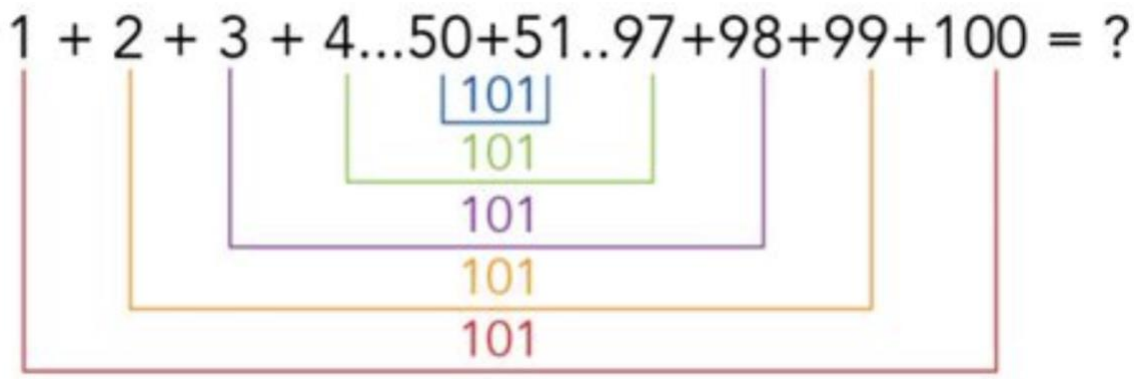
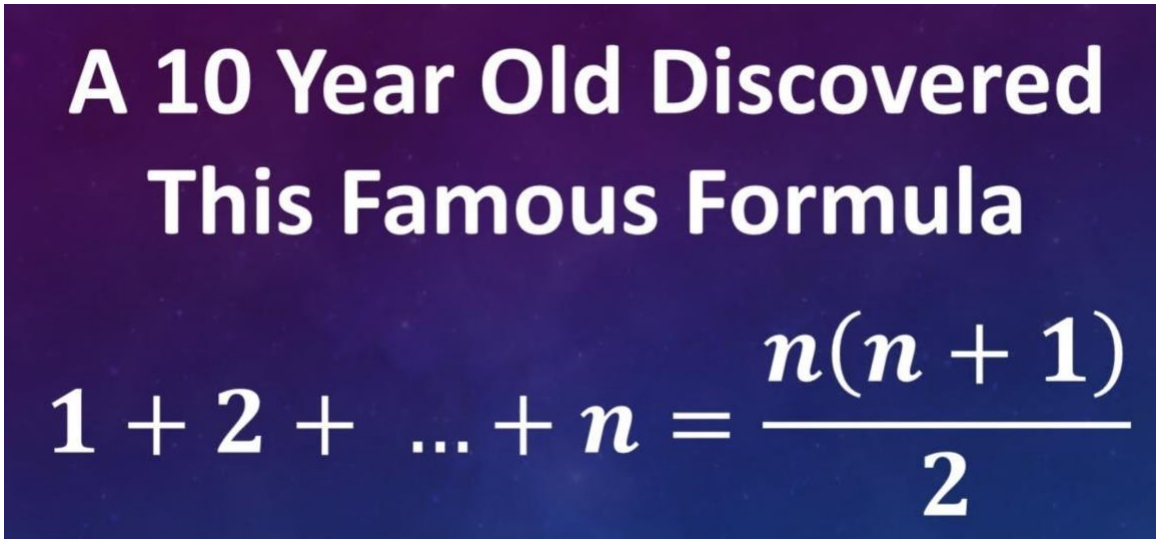
8

(i) What is$1+2+3+\cdots+100$?

(i) What is1+2+3+⋯+100?

5050





(j) How many edges can a simple (undirected, no vertex loops) graph with n vertices can have?

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$$\binom{n}{2}$$

n choose 2

(k) How many edges does a tree on n vertices have?

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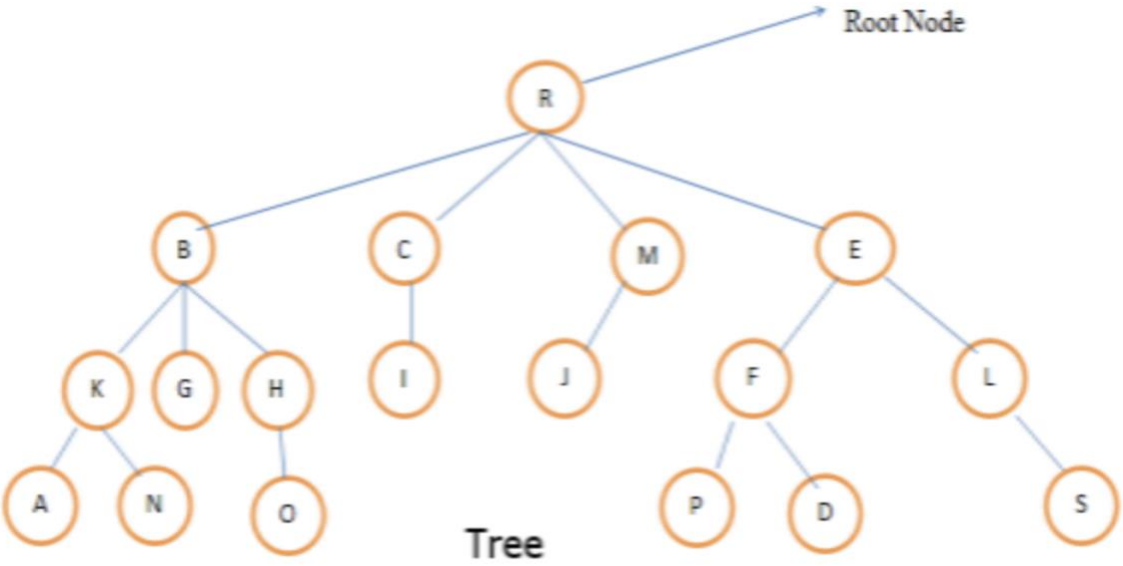
n - 1



(l) Let G = (V, E) be a simple graph.

What is $\sum_{v \in V} \deg(v)$?

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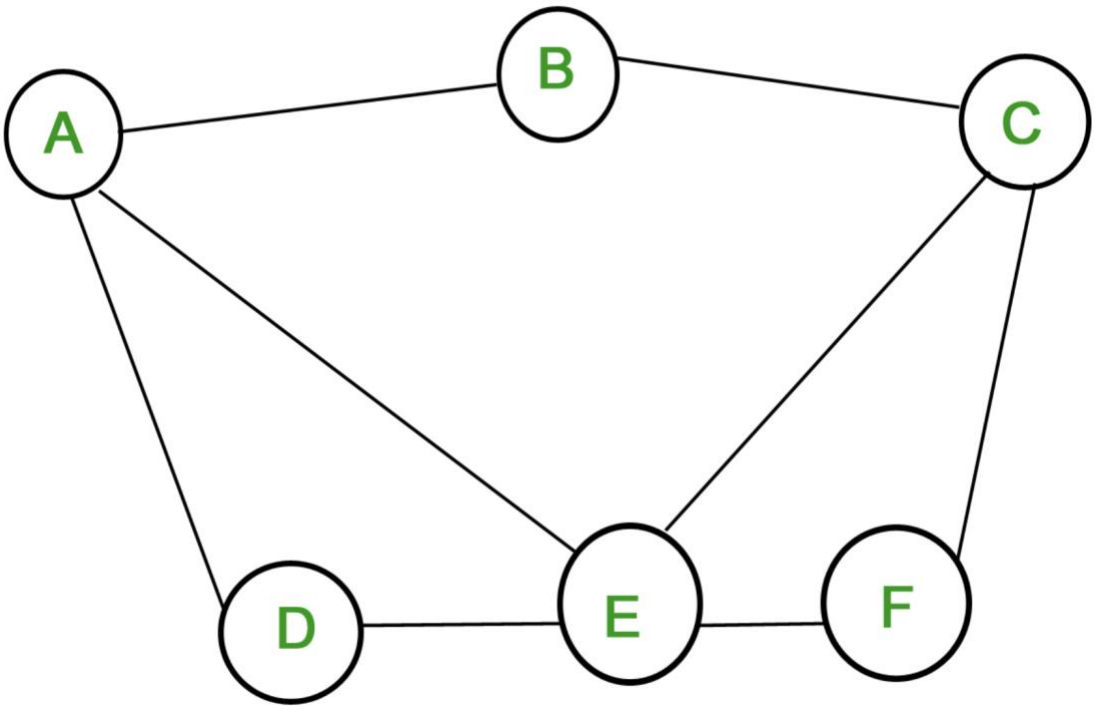
What is $\sum_{v \in V} \deg(v)$?

$2|E|$



(m) For large n, which is smaller: $\Theta(n^{10})$ or $\Theta((1.01)^n)$?

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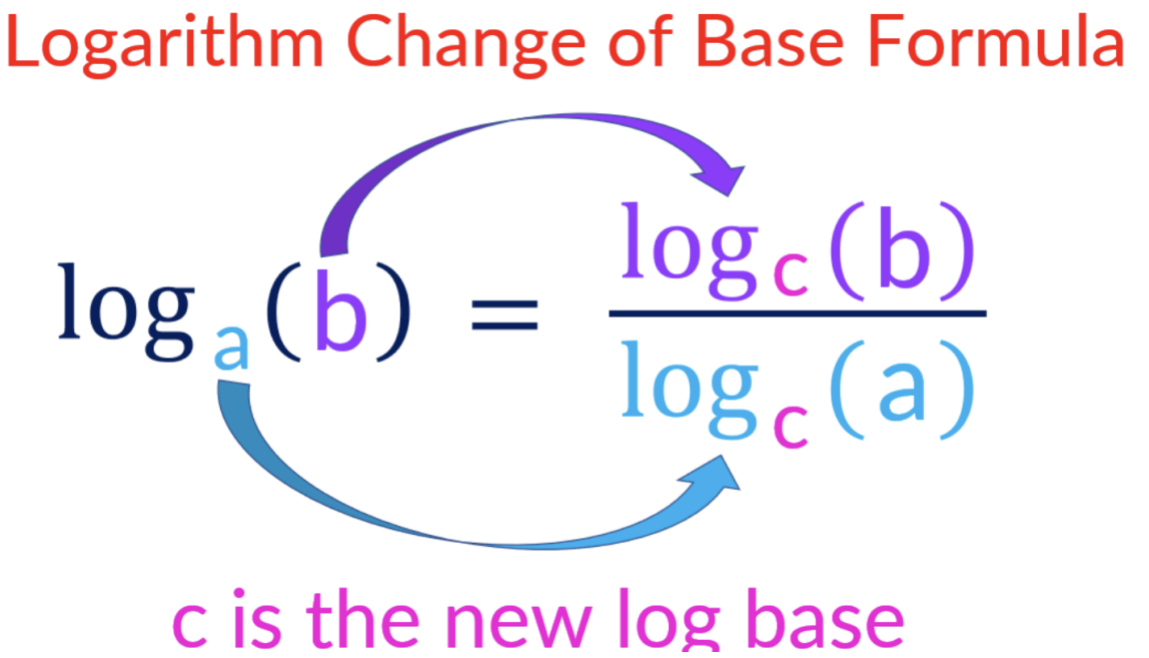
$\Theta(n^{10})$

How to prove this?



2. Which area(s) of Computer Science interest you the most?

3. What topic(s) of this course are you most looking forward to?

4. What topic(s) of this course are you least looking forward to?

5. Is there anything else you'd like to say?