Section 4.2: Factorial and Exponential Growth

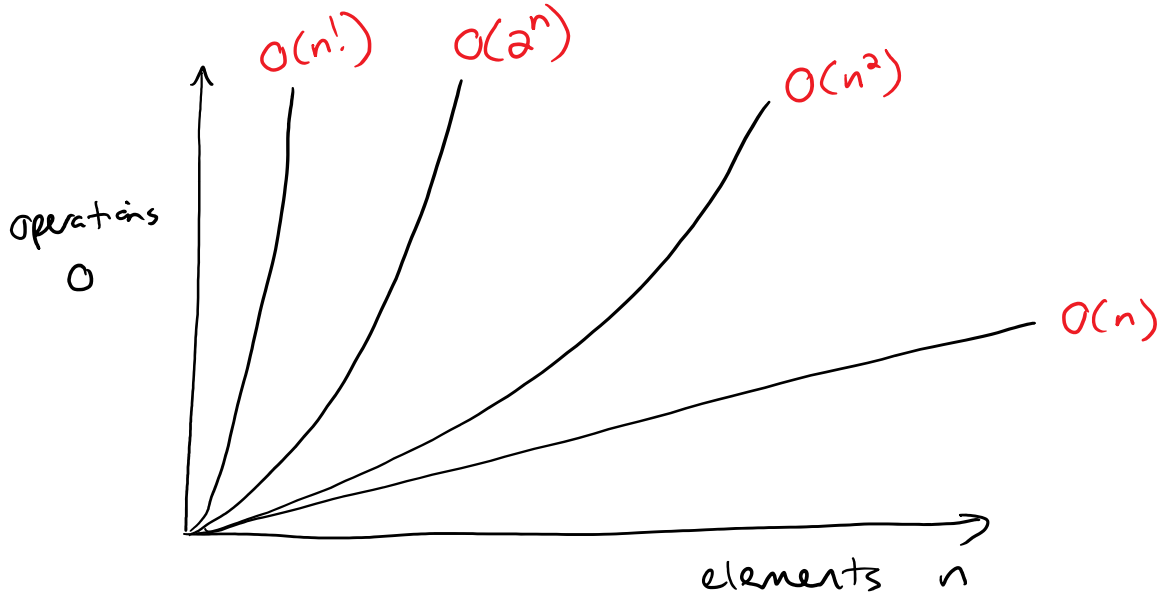
Friday, October 11, 2019 11:42 AM

n	polynomical n^2	exponential 2^n	factorial $n!$
1	1	2	1
2	4	4	2
3	9	8	6
4	16	16	24
5	25	32	120
10	100	1024	3 628 800
100	10000	1.267×10^{30}	9.33×10^{157}

note: $3! = 3 \cdot 2 \cdot 1$

$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$

$n! = n(n-1)(n-2) \cdots 3 \cdot 2 \cdot 1$



What I will be testing you on is ranking the various orders: $O(n)$, $O(n^2)$, etc...

so that you know the general shape of each graph and are able to tell which one is more efficient as n gets large

What if the order of Big O looks like

$$O(n^2 + 2n + 5)?$$

n	n^2	$2n$	5	$n^2 + 2n + 5$
1	1	2	5	8
10	100	20	5	125
100	10000	200	5	10205
1000	1000 000	2000	5	100 2005

as n gets very large, the contributions to the total from $2n$ and from 5 become very small in comparison to the contribution from the n^2 term

so for large n, $O(n^2 + 2n + 5)$ is approximately equal to $O(n^2)$

$$O(n^2 + 2n + 5) \approx O(n^2)$$

$\approx$: approximately equal to