Big Oh Analysis

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Time (ms) of Method Execution

Input Size:	1	10	10^2	10^3	10^4	10^5	10^6	10^7	10^8
Binary Search (logn)	0	0	0	0	0	0	0	1	1
Max (n)	0	0	0	1	2	2	5	8	33
Multi Binary Search (nlogn)	1	1	1	1	2	11	67	755	8348
All Pairs (n^2)	0	0	1	10	188	17752	>60000	>60000	>60000
All Triads (n^3)	1	1	8	221	>60000	>60000	>60000	>60000	>60000
All Subsets (2^n)	1	1	>60000	>60000	>60000	>60000	>60000	>60000	>60000

The time complexity of the Binary Search method is O(log(n)). The function y = log(x) grows logarithmically. Thus it makes sense that the Binary Search maintains quick runtimes as n increases drastically. The method starts to slow drastically for some $n > 10^8$.

The time complexity of the Max method is O(n). The function y = n grows more quickly than the logarithmic function. The runtime of Max is directly proportional to n. The method starts to slow drastically for some $n > 10^8$.

The time complexity of the Multi Binary Search method is O(nlog(n)). The function y = nlog(n) grows linearly but is greater than y = n for all n > 10. Thus it makes sense that as n increases the runtimes are larger than that of the Max() method. The method slows drastically for some $n > 10^8$.

The time complexity of the All Pairs method is $O(n^2)$. The function $y = n^2$ grows exponentially and is greater than the y = nlog(n) for all n. Thus it makes sense that as n increases the runtimes are larger than that of the Multi Binary Search method. The method slows drastically approximately when $n \geq 10{,}000$.

The time complexity of the All Triads method is $O(n^3)$. The function $y = n^3$ grows exponentially and is greater than $y = n^2$ for all n > 1. Thus it makes sense that as n increases the runtimes are larger than that of the All Pairs method. The method slows drastically when $n \geq 10{,}000$.

The time complexity for the All Subsets method is $O(2^n)$. The function $y = 2^n$ grows exponentially and is greater than $y = n^3$ for all n. Thus it makes sense that the runtimes are larger than that of the All Triads method. The method slows drastically when $n \geq 100$.