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CS251 Project 2

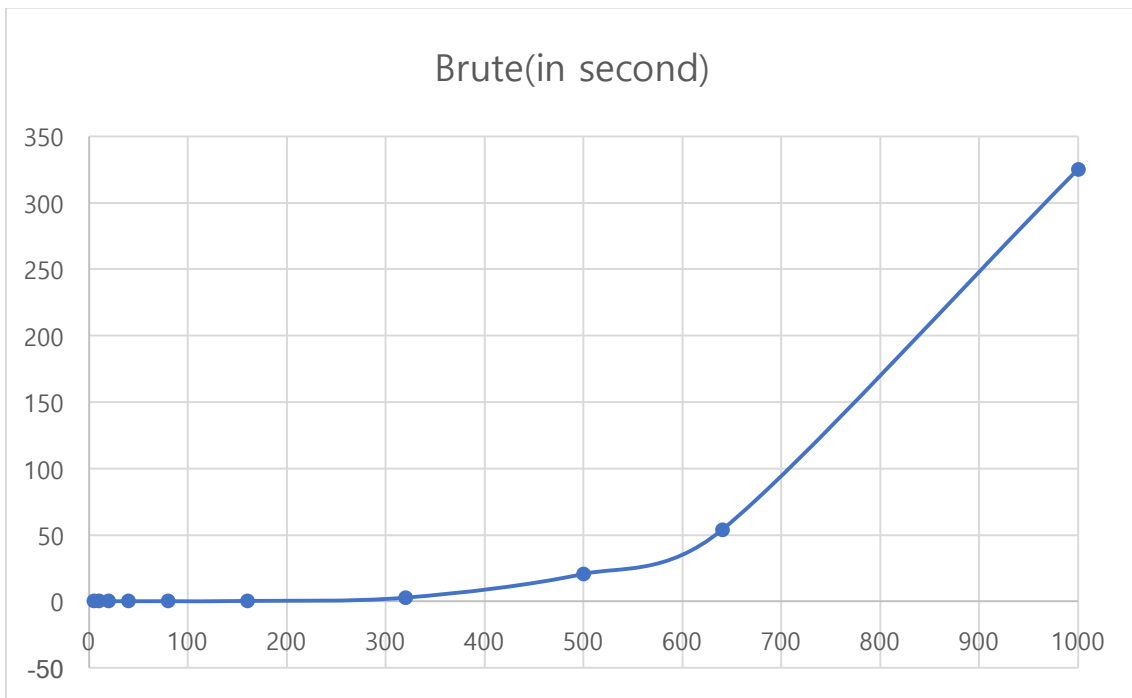
Brute : $(3.27 \times 10^{-10}) * n(n-1)(n-2)(n-3) + n^2 \sim n^4$ **because 4 nested for loops accords input + sorting by brute force takes n^2 .**

Fast: $\sim (6.70228 \times 10^{-8}) * n^2 + n \log n \sim n^2$ because I have 2 nested for loops accords input value with sorting by merge sort that takes $O(n \log n)$

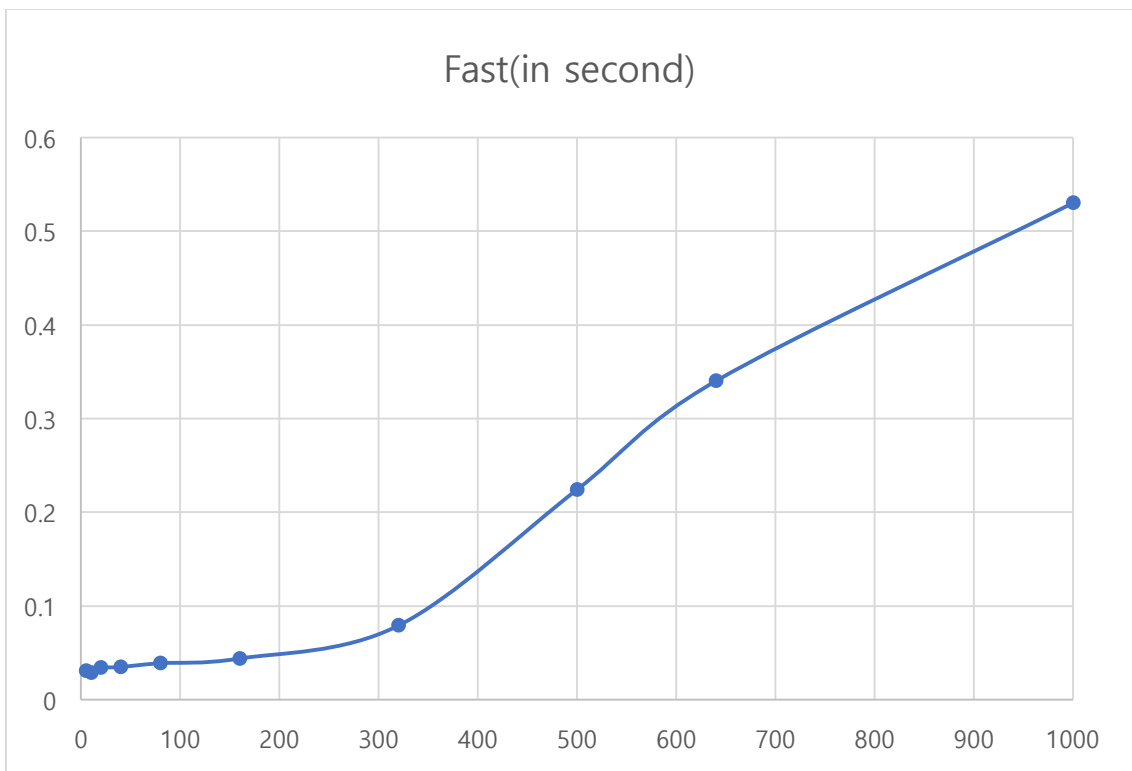
Table of N = {5,10,20,40,80,160,320,500,640,1000}

N	Brute(in second)	Fast(in second)
5	0.031	0.031
10	0.032	0.029
20	0.032	0.034
40	0.036	0.035
80	0.053	0.039
160	0.242	0.044
320	2.711	0.079
500	20.558	0.224
640	53.667	0.340
1000	325.055	0.53

brute:



fast:



You can see that the plot goes as log sign for fast(concave down) and exponential for brute(concave down).

Estimating $N = 1000000$:

Brute $(3.27 \times 10^{-10}) * ((1,000,000)(999999)(999998)(999997) + (1000000)^2) =$
 3.26998×10^{14} seconds

Fast $(6.70228 \times 10^{-8}) * (1000000^2 + 1000000 \log 1000000) = 992977$ seconds