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CS 162.400
Lab 10 Analysis

Iterative		Recursive	
N	Elapsed Time (Nanoseconds)	N	Elapsed Time (Nanoseconds)
10	0	10	0
1000	0	20	0
201000	997,000	25	997,000
300000	998,000	30	5,984,000
500000	997,000	35	66,822,000
1000000	2,992,000	40	739,026,000

There is a very clear advantage to using the iterative approach rather than the recursive approach. The time complexity for the iterative approach is linear ($O(n)$), while the recursive approach is exponential ($O(2^n)$). One reason for the difference in time complexities is that the recursive approach requires a significant amount of repeated work. Take n = 6 for example. The algorithm would start by finding fib(5) + fib(4), but fib(5) will also need the return value of fib(4), thus repeating the same computation. The recursive approach is also repetitively invokes itself, which requires substantially more overhead than just the single function call required by the iterative method.