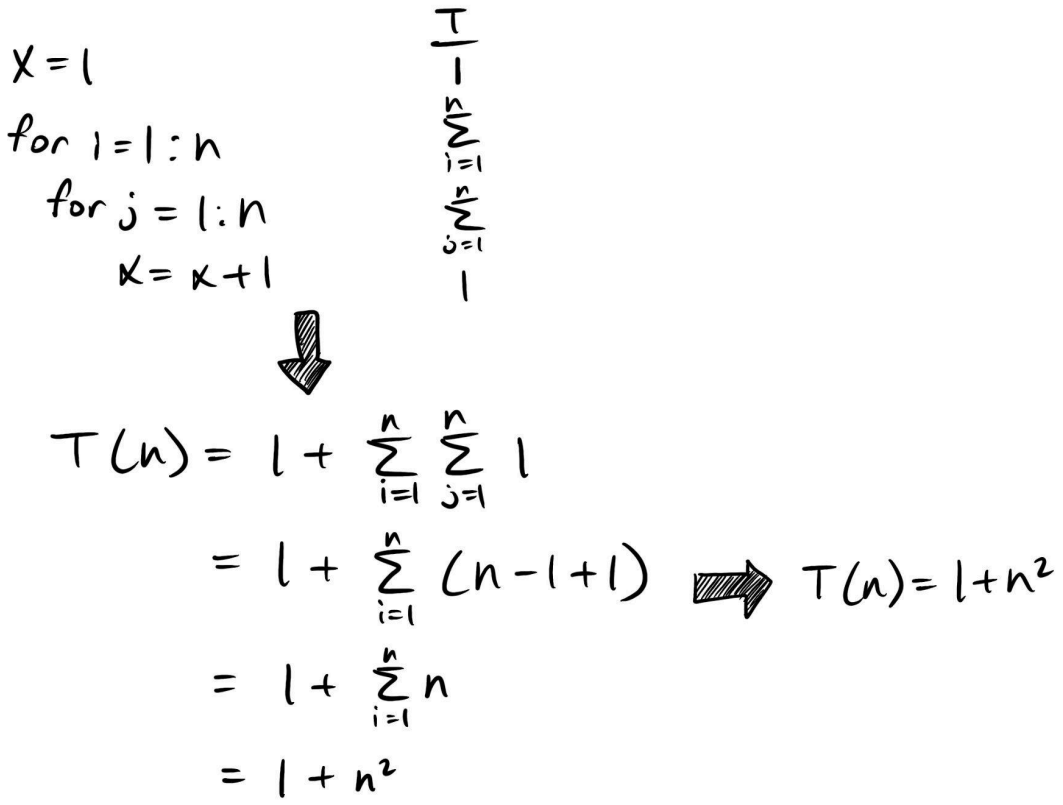
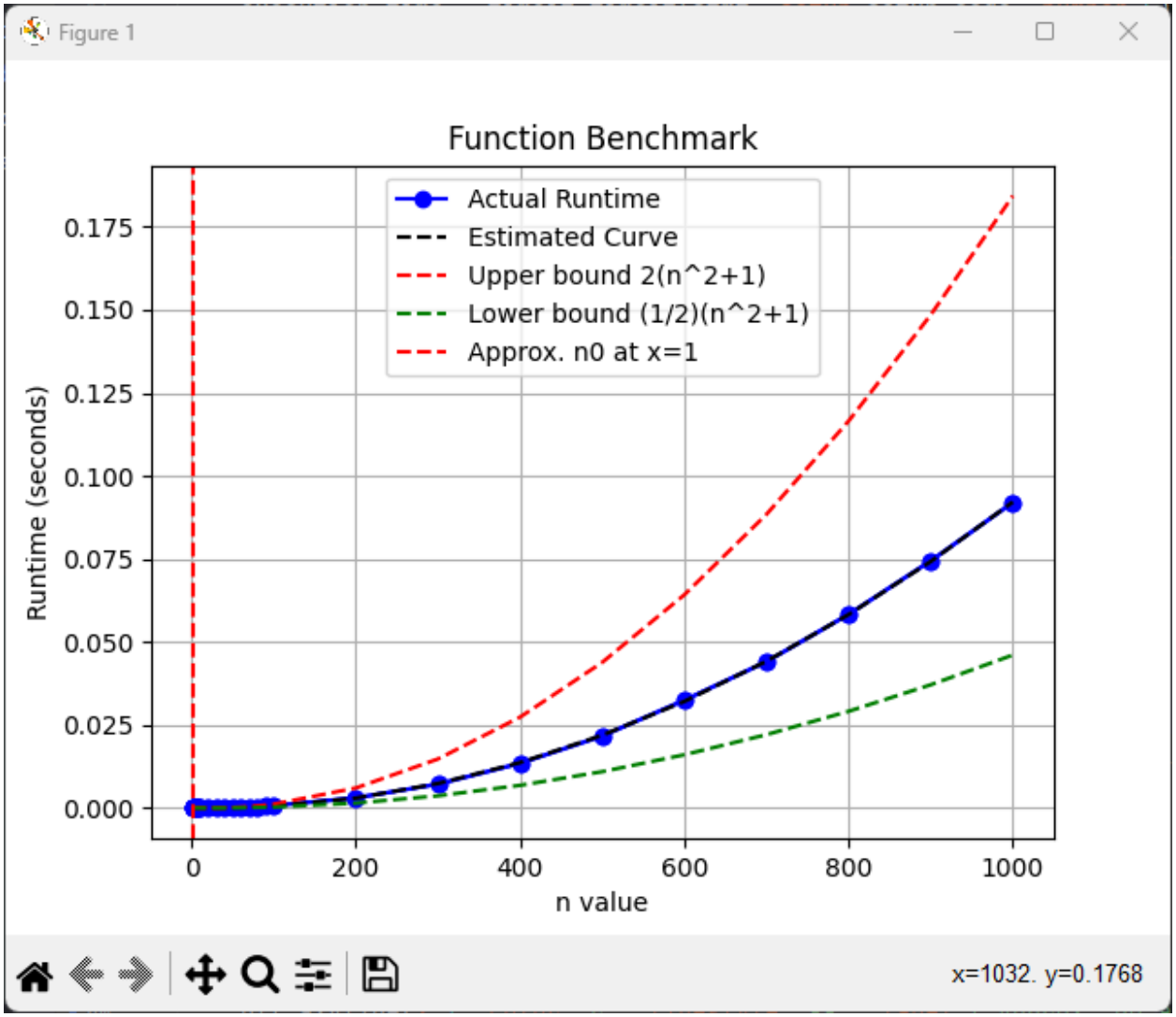
Hands On 3 Questions/Answers

Part 1:



So the runtime should be 1+n^2 or θ(n^2).

Part 2:

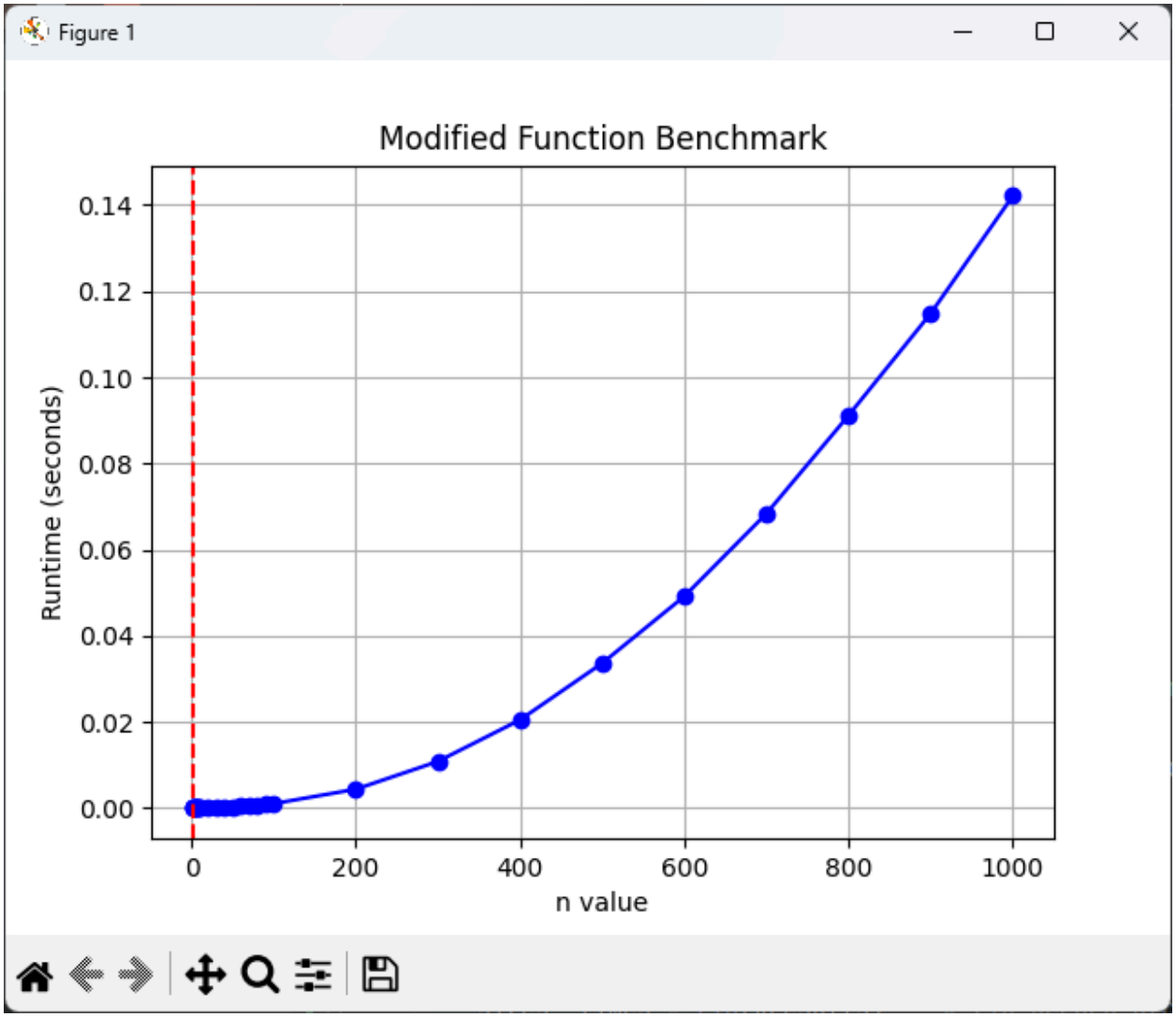


Part 3: I chose the upper bound to be 2(n^2+1) and the lower bound to be (1/2)(n^2+1) where the estimate curve fits inside between them.

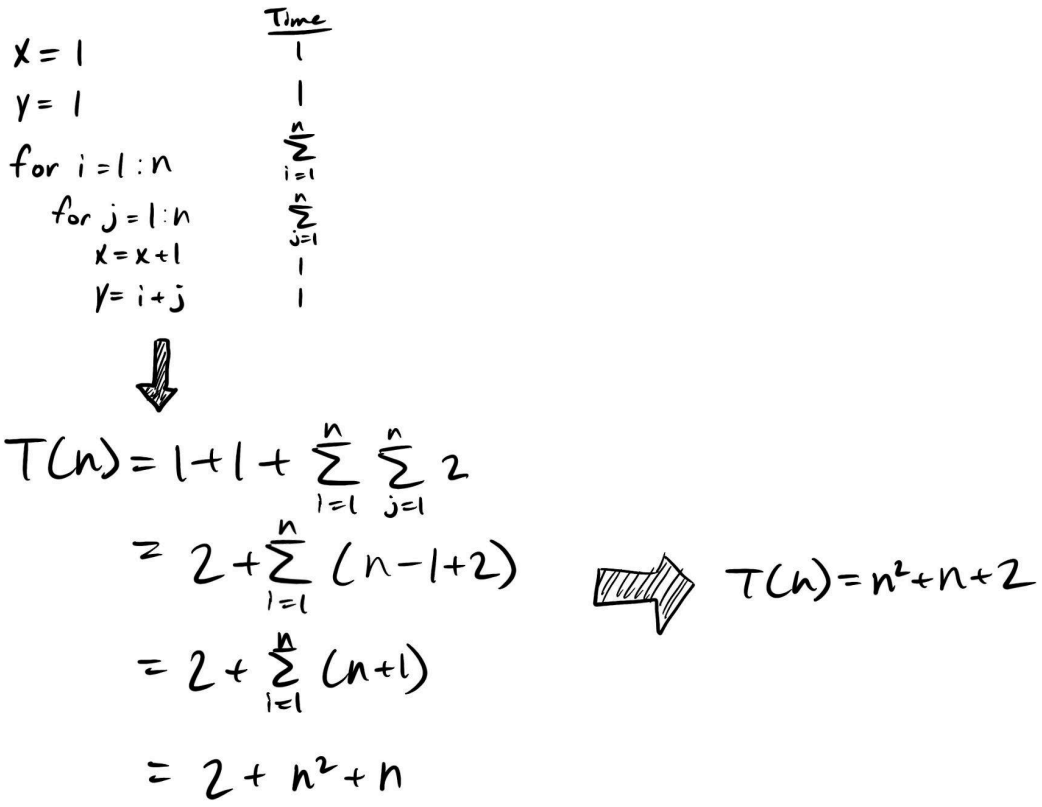
The values are O(n^2), Ω(n^2), θ(n^2).

Part 4: n_0 should be at x=1 where the runtime is very close to 0. I picked this value because without the n^2 in 1+n^2, 1 is left over.

Part 4(for modified function):
Yes this will increase the time the function takes.



Part 5:
Yes it will affect the results from number 1 by increasing it. Although it will still be a polynomial and in theta form the runtime will still be θ(n^2).



Part 6:
Mergesort shown here:

```
Test array before: [5, 2, 4, 7, 1, 3, 2, 6]
Sorted: [2, 5]
Sorted: [4, 7]
Sorted: [2, 4, 5, 7]
Sorted: [1, 3]
Sorted: [2, 6]
Sorted: [1, 2, 3, 6]
Sorted: [1, 2, 2, 3, 4, 5, 6, 7]
Test array after: [1, 2, 2, 3, 4, 5, 6, 7]

Process finished with exit code 0
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