Questions 1 to 4
Using an exhaustive search, how many possible solutions must be tested for each of the following problems for input size n?

1. Finding the closest pair of points. $n^2$
   
   $n(n-1)/2$ or $O(n^2)$

2. Finding the convex hull. $2^n$
   
   all subsets of n points must be considered.
   the power-set of n-points is $2^n$, so good answer is $O(2^n)$
   another way to answer:
   $2^n - 1 - (n \text{ choose } 1)$
   1 is the null set
   $(n \text{ choose } 1)$ is subsets with just 1 point

3. Finding all n-queens solutions. $n^n$
   
   $n^n$ or Big-Theta($n^n$)

4. Sorting an array. $n!$
   
   all permutations of the array values must be considered.
   $(n \text{ choose } k)$, where $k = n$
   $= n!/(n-k)!$
   $= n!/0!$
   $= n!/1$
   $= n!$
   Big-Theta($n!$)

5. What is the Manhattan distance between these points?

   $(3,4), (11,-2)$
   
   $|3-11| + |4-(-2)| = 8 + 6 = 14$

   This question was from lecture.
6. Your algorithm has nested loops, and the inner loop performs a square-root function. Removing the square-root function makes the inner loop run 10-times faster. How much faster will your algorithm run.

A. 10 times faster
B. 100 times faster
C. 10n times faster
D. \( n^2 \) times faster
E. no faster

Lots of arguments on this question so keep looking at it please. Process of elimination was probably a good way to choose an answer.

Answer C seems plausible, but it is saying that as \( n \) grows, my algorithm runs even faster.

Here is an algorithm scenario that fits the question:

```plaintext```
for (i=0; i<n; i++)
    for (j=0; j<n; j++)
        d = sqrt(xd2+yd2);
```

Sqrt will be performed \( n^2 \) times, a constant number of times. Execution time of the inner loop was reduced, but the number of iterations was not changed.

If you can prove answer B, C, or D to be true, then you will probably be hired by Google or Microsoft and become CEO after only a few days.