CSC165 Quiz 9, Thursday July 28th

Name: Student number:

Last lecture we determined that the running time for linear search, $LS(A, x)$ on an array A of length n, denoted $t_{LS}(A, x)$ was:

- $tp_{LS}(A, x) = 15$ if $A[0] == x$ (best case).
- $tp_{LS}(A, x) = 15n + 10$, if x is not in the array (wors5 case)

Let $T_p(n) = \max\{tp_{LS}(A, x) : A \text{ has length } n\}$. Answer the following questions. Briefly justify your answer WITHOUT writing a formal proof.

1. Is $T_p(n) \in O(n)$?

   Yes. If $n \geq 10$ and $c = 16$, then $T_p(n) = 15n + 10 \leq 16n$.

2. is $T_p(n) \in O(1/n)$?

   No. There is no constant that will make $15n + 10 \leq c/n$, once n is somewhat greater than $16c$.

3. Is $T_p(n) \in O(n^2)$?

   Yes. Being in $O(n)$ implies being in $O(n^2)$.

4. Is $T_p(n) \in O(2^n)$?

   Yes. If $c = 1$ and $n \geq 10$, then $T_p(n) = 15n + 10 \leq 2^n$.

5. Is $T_p(n) \in \Omega(1/(n + 1))$?

   Yes. For every n, $1/(n + 1) < 1$ so $T_p(n) = 15n + 10 \geq 1/(n + 1)$.