

CSC317 Fall 2021

Instructor: Odelia Schwartz

Assignment 2

Sept 7, 2021 (due Sept 14 2021 by midnight, on Blackboard). Note: Some of the questions are based on the Cormen textbook. Points listed below are for relative weighting of the questions in this assignment. Each assignment will in the end be weighted equally.

1. Express the function $\frac{n^4}{900} - 30n^2 + 6$ in terms of big Theta θ notation. Explain your answer (you do not need to prove, but explain your logic). **(5 points)**

2. List in order from fastest run time to slowest run time the following functions (for instance n^2 is faster than n^3 , so you would list n^2 first and below it you would list n^3). If two functions are asymptotically similar in their run time (for instance, n^2 and $10n^2$ are asymptotically similar; they are both $\Theta(n^2)$), list them together. Explain your answer (no need to formally prove; just explain the logic that you followed in the ordering). **(10 points)**

- a. $n^3 - 2n^2$
- b. 5
- c. n^3
- d. $\log_2 n$
- e. n
- f. $n \log_2 n$
- g. $\log_5 n$
- h. $n^{1.2}$
- i. $\left(\frac{5}{4}\right)^n$
- j. $n^{2.8}$

3. Explain why the statement, “The running time of algorithm A is at least $O(n^3)$,” is meaningless. **(5 points)**

4. Why is it usually more useful to find/report big O than big Omega? **(4 points)**

5. Which of the following functions are $O(n^2)$. Explain your answer (you do not need to prove, but explain your logic). **(6 points)**

- a. $5n + 5$
- b. $3n^2 - 7$
- c. $6n^4 + 5$