
csce350 — Data Structures and Algorithms
Fall 2019 — Homework 03

Assigned: Sept 3

Due: September 10, 10:04am

2.2.3 (no proofs needed, just list the simplest correct $g(n)$)

Consider a hypothetical algorithm that executes its basic operation

$$t(n) = 300n^2 + 150n + \log n$$

times for every input of size n . Prove, using the definition of Θ notation, that $t(n) \in \Theta(n^2)$.

Consider three functions:

- $t_1(n) = \log n$
- $t_2(n) = n$
- $t_3(n) = \frac{n(n-1)}{2}$

Classify each of the following statements as **True** or **False**.

- | | | |
|--------------------------------|---------------------------------|---------------------------------|
| 1. $t_1(n) \in \Omega(t_1(n))$ | 10. $t_2(n) \in \Omega(t_1(n))$ | 19. $t_3(n) \in \Omega(t_1(n))$ |
| 2. $t_1(n) \in \Theta(t_1(n))$ | 11. $t_2(n) \in \Theta(t_1(n))$ | 20. $t_3(n) \in \Theta(t_1(n))$ |
| 3. $t_1(n) \in O(t_1(n))$ | 12. $t_2(n) \in O(t_1(n))$ | 21. $t_3(n) \in O(t_1(n))$ |
| 4. $t_1(n) \in \Omega(t_2(n))$ | 13. $t_2(n) \in \Omega(t_2(n))$ | 22. $t_3(n) \in \Omega(t_2(n))$ |
| 5. $t_1(n) \in \Theta(t_2(n))$ | 14. $t_2(n) \in \Theta(t_2(n))$ | 23. $t_3(n) \in \Theta(t_2(n))$ |
| 6. $t_1(n) \in O(t_2(n))$ | 15. $t_2(n) \in O(t_2(n))$ | 24. $t_3(n) \in O(t_2(n))$ |
| 7. $t_1(n) \in \Omega(t_3(n))$ | 16. $t_2(n) \in \Omega(t_3(n))$ | 25. $t_3(n) \in \Omega(t_3(n))$ |
| 8. $t_1(n) \in \Theta(t_3(n))$ | 17. $t_2(n) \in \Theta(t_3(n))$ | 26. $t_3(n) \in \Theta(t_3(n))$ |
| 9. $t_1(n) \in O(t_3(n))$ | 18. $t_2(n) \in O(t_3(n))$ | 27. $t_3(n) \in O(t_3(n))$ |