

Week 2: Practice Quiz

Topics: asymptotic notation and summations

COLLABORATION LEVEL: 0 (NO RESTRICTIONS). OPEN NOTES. MAX TIME: UNLIMITED

1. $f = O(g)$ implies that $g = O(f)$
2. $f = O(g)$ implies that $g = \Omega(f)$
3. $f = O(g)$ implies that $f = \Theta(g)$
4. $f = \Theta(g)$ implies that $f = O(g)$
5. Find the order of growth of $f(n) = \lg n^2$
 - A. $f(n) = \Theta(\lg n)$
 - B. $f(n) = \Theta(\lg^2 n)$
 - C. $f(n) = \Theta(\lg \lg n)$
6. Find the order of growth of $f(n) = 3n \lg n + n^2 + n \lg^3 n + 100$
 - A. $f(n) = \Theta(n \lg n)$
 - B. $f(n) = \Theta(n^2)$
 - C. $f(n) = \Theta(n^2 \lg n)$
7. Find the order of growth of $f(n) = n \lg \lg n + n \lg n + \sqrt{n} \lg^2 n$
 - A. $\Theta(n \lg \lg n)$
 - B. $\Theta(n \lg n)$
 - C. $\Theta(\sqrt{n} \lg^2 n)$
8. Find the order of growth of $f(n) = 3^{\lg n} + n^2 + n \lg n$
 - A. $\Theta(3^{\lg n})$
 - B. $\Theta(n^2)$
 - C. $\Theta(n \lg n)$
9. Find the order of growth of $f(n) = 2^n + 2^{2n}$
 - A. $\Theta(2^n)$
 - B. $\Theta(2^{2n})$

10. Find the order of growth of $f(n) = 2^{\lg n} + \lg n^2$
- A. $\Theta(n)$
 - B. $\Theta(\sqrt{n})$
 - C. $\Theta(\lg n)$
11. Find the order of growth of $f(n) = n \lg^2 n + n^2 \lg n$
- A. $\Theta(n \lg^2 n)$
 - B. $\Theta(n^2 \lg n)$
12. Find the order of growth of $f(n) = \sqrt{2}^{\lg n}$
- A. $f(n) = \Theta(\sqrt{n})$
 - B. $f(n) = \Theta(n^{\sqrt{2}})$
 - C. $f(n) = \Theta(\lg^{\sqrt{2}} n)$
13. $2n + 5 \lg n = O(n)$
14. $2n + 5 \lg n = \Omega(n)$
15. $2n + 5 \lg n = \Theta(n)$
16. $\sqrt{n} = O(n)$
17. $\lg \lg n = O(\lg n)$
18. $\lg^2 n = \Theta(\lg n^2)$
19. $n = O(\sqrt{2}^{\lg n})$
20. $n^2 = O(n \lg n)$
21. $\sqrt{2}^{\lg n} = O(\frac{3^n}{2})$
22. $n^3 = O(\frac{3^n}{2})$
23. $2^n = \Theta(2^{n+1})$
24. $2^n = \Theta(2^{2n})$
25. $2^{2n} = \Theta(4^n)$

1 Appendix: WITH Answers

1. $f = O(g)$ implies that $g = O(f)$ False
2. $f = O(g)$ implies that $g = \Omega(f)$ True
3. $f = O(g)$ implies that $f = \Theta(g)$ False
4. $f = \Theta(g)$ implies that $f = O(g)$ True
5. Find the order of growth of $f(n) = \lg n^2$:
 $f(n) = \Theta(\lg n)$ (correct)
6. Find the order of growth of $f(n) = 3n \lg n + n^2 + n \lg^3 n + 100$
B. $f(n) = \Theta(n^2)$ Correct
7. Find the order of growth of $f(n) = n \lg \lg n + n \lg n + \sqrt{n} \lg^2 n$
A. $\Theta(n \lg n)$ correct
8. Find the order of growth of $f(n) = 3^{\lg n} + n^2 + n \lg n$
B. $\Theta(n^2)$ correct
9. Find the order of growth of $f(n) = 2^n + 2^{2n}$
B. $\Theta(2^{2n})$ correct
10. Find the order of growth of $f(n) = 2^{\lg n} + \lg n^2$
A. $\Theta(n)$ correct
11. Find the order of growth of $f(n) = n \lg^2 n + n^2 \lg n$
B. $\Theta(n^2 \lg n)$ Correct
12. Find the order of growth of $f(n) = \sqrt{2}^{\lg n}$
A. $f(n) = \Theta(\sqrt{n})$ (correct)
13. $2n + 5 \lg n = O(n)$ True
14. $2n + 5 \lg n = \Omega(n)$ True
15. $2n + 5 \lg n = \Theta(n)$ True
16. $\sqrt{n} = O(n)$ True
17. $\lg \lg n = O(\lg n)$ True
18. $\lg^2 n = \Theta(\lg n^2)$ False
19. $n = O(\sqrt{2}^{\lg n})$ False
20. $n^2 = O(n \lg n)$ False

21. $\sqrt{2}^{\lg n} = O(\frac{3^n}{2})$ True

22. $n^3 = O(\frac{3^n}{2})$ True

23. $2^n = \Theta(2^{n+1})$ true

24. $2^n = \Theta(2^{2n})$ false

25. $2^{2n} = \Theta(4^n)$ true