

5. Algebraic Approach to Limits – Homework

Find the following limits.

1. $\lim_{x \rightarrow 5} 12$

2. $\lim_{x \rightarrow 0} 2\pi$

3. $\lim_{x \rightarrow 2} 4x$

4. $\lim_{x \rightarrow 5} 3x^2 - 4x - 1$

5. $\lim_{x \rightarrow 0} 5x^3 - 7x^3 + 2^x - 2$

6. $\lim_{y \rightarrow -1} 3y^4 - 6y^3 - 2y$

7. $\lim_{x \rightarrow 4} \frac{2x-4}{x-1}$

8. $\lim_{x \rightarrow -2} \frac{x^2 + 4x + 4}{x^2}$

9. $\lim_{x \rightarrow 1} \frac{2x-2}{x-1}$

10. $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4}$

11. $\lim_{t \rightarrow -2} \frac{t^3 + 8}{t + 2}$

12. $\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x^2 + x - 6}$

13. $\lim_{x \rightarrow -1} \frac{x^2 + 6x + 5}{x^2 - 3x - 4}$

14. $\lim_{x \rightarrow 2} \frac{x^3 + x^2 - 4x - 4}{x^4 - 16}$

15. $\lim_{x \rightarrow 3} \frac{x}{x-3}$

16. $\lim_{x \rightarrow 5} \frac{x}{x^2 - 25}$

17. $\lim_{y \rightarrow 6} \frac{y+6}{y^2 - 36}$

18. $\lim_{x \rightarrow 4} \frac{3-x}{x^2 - 2x - 8}$

19. $\lim_{x \rightarrow 1} \frac{4}{x^2 - 2x + 1}$

20. $\lim_{x \rightarrow 5} \frac{x}{|x-5|}$

21. $\lim_{x \rightarrow 3} \frac{-x^2}{(x-3)^2}$

22. $f(x) = \begin{cases} x-1, & x \leq 3 \\ 2x-3, & x > 3 \end{cases}$
 find $\lim_{x \rightarrow 3} f(x)$. Show work.

23. $f(x) = \begin{cases} \cos x - \sin \pi, & x \leq \pi \\ x - \pi - 1, & x > \pi \end{cases}$
 find $\lim_{x \rightarrow \pi} f(x)$. Show work.

24. $f(x) = \begin{cases} x^3 + x, & x \leq -1 \\ -2^{-x}, & x > -1 \end{cases}$
 find $\lim_{x \rightarrow -1} f(x)$. Show work.

25. $f(x) = \begin{cases} \frac{x-2}{x-1}, & x < 1 \\ \frac{x}{x-1}, & x > 1 \end{cases}$ find $\lim_{x \rightarrow 1} f(x)$
 Show work.

26. Find $\lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}$

27. Find $\lim_{x \rightarrow 4} \frac{x^2 - 2x - 8}{\cos \pi x (x - 4)}$

28. If $f(x) = \begin{cases} x^2 - 2x - 3, & x \neq 2 \\ k - 3, & x = 2 \end{cases}$
 find k such that $\lim_{x \rightarrow 2} f(x) = f(2)$

29. $f(x) = \begin{cases} \frac{x^2 - 49}{x - 7}, & x \neq 7 \\ k^2 - 2, & x = 7 \end{cases}$ find k such that
 $\lim_{x \rightarrow 7} f(x) = f(7)$

30. Find $\lim_{x \rightarrow \infty} 6$

31. Find $\lim_{x \rightarrow -\infty} (11 - 2x)$

32. $\lim_{x \rightarrow \infty} (0.2x^4 - x^2 - 9)$

33. $\lim_{x \rightarrow \infty} 2^{-x}$

34. Find $\lim_{x \rightarrow \infty} \frac{2x-3}{4x+5}$

35. Find $\lim_{x \rightarrow -\infty} \frac{7-3x^3}{2x^3+1}$

36. Find $\lim_{x \rightarrow \infty} \frac{2}{5x-4}$

37. Find $\lim_{x \rightarrow \infty} \frac{4x^5}{1-5x^3}$

38. Find $\lim_{x \rightarrow \infty} \frac{x}{\sqrt{x^2+4}}$

39. $\lim_{x \rightarrow \infty} \frac{x}{\sqrt{x^2+4}}$

40. $\lim_{x \rightarrow -\infty} \frac{\sqrt{3x^2+x}}{x^2-1}$

41. $\lim_{x \rightarrow \infty} \frac{\sqrt{3x^2+x}}{x-1}$