

PRACTICE PROBLEMS

Try these 30 problems to test your skill with limits. The answers are in chap

1. $\lim_{x \rightarrow 8} (x^2 - 5x - 11) =$

2. $\lim_{x \rightarrow 2} \left(\frac{x+3}{x^2-15} \right) =$

3. $\lim_{x \rightarrow 0} \pi^x =$

4. $\lim_{x \rightarrow 3} \left(\frac{x^2 - 2x - 3}{x - 3} \right) =$

~~5.~~ $\lim_{x \rightarrow \infty} \left(\frac{10x^2 + 25x + 1}{x^4 - 8} \right) =$

~~6.~~ $\lim_{x \rightarrow \infty} \left(\frac{x^4 - 8}{10x^2 + 25x + 1} \right) =$

~~7.~~ $\lim_{x \rightarrow \infty} \left(\frac{x^4 - 8}{10x^4 + 25x + 1} \right) =$

~~8.~~ $\lim_{x \rightarrow \infty} \left(\frac{\sqrt{5x^4 + 2x}}{x^2} \right) =$

9. $\lim_{x \rightarrow 6} \left(\frac{x+2}{x^2 - 4x - 12} \right) =$

10. $\lim_{x \rightarrow 6} \left(\frac{x+2}{x^2 - 4x - 12} \right) =$

11. $\lim_{x \rightarrow 6} \left(\frac{x+2}{x^2 - 4x - 12} \right) =$

12. $\lim_{x \rightarrow 0^+} \left(\frac{x}{|x|} \right) =$

13. $\lim_{x \rightarrow 0^-} \left(\frac{x}{|x|} \right) =$

14. $\lim_{x \rightarrow 7} \left(\frac{x}{x^2 - 49} \right) =$

15. $\lim_{x \rightarrow 7} \left(\frac{x}{x^2 - 49} \right) =$

16. $\lim_{x \rightarrow 7} \frac{x}{(x-7)^2} =$

17. Let $f(x) = \begin{cases} x^2 - 5, & x \leq 3 \\ x + 2, & x > 3 \end{cases}$

Find: (a) $\lim_{x \rightarrow 3^-} f(x)$; (b) $\lim_{x \rightarrow 3} f(x)$; and (c) $\lim_{x \rightarrow 3} f(x)$

18. Let $f(x) = \begin{cases} x^2 - 5, & x \leq 3 \\ x + 1, & x > 3 \end{cases}$

Find: (a) $\lim_{x \rightarrow 3^-} f(x)$; (b) $\lim_{x \rightarrow 3} f(x)$; and (c) $\lim_{x \rightarrow 3} f(x)$

19. Find $\lim_{x \rightarrow \frac{\pi}{4}} 3 \cos x$.

20. Find $\lim_{x \rightarrow 0} 3 \frac{x}{\cos x}$

21. Find $\lim_{x \rightarrow 0} 3 \frac{x}{\sin x}$

22. Find $\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 8x}$

23. Find $\lim_{x \rightarrow 0} \frac{\tan 7x}{\sin 5x}$

24. Find $\lim_{x \rightarrow \infty} \sin x$.

25. Find $\lim_{x \rightarrow \infty} \frac{1}{x}$

26. Find $\lim_{x \rightarrow 0} \frac{x^2 \sin x}{1 - \cos^2 x}$

27. Find $\lim_{x \rightarrow 0} \frac{\sin^2 7x}{\sin^2 11x}$

28. Find $\lim_{h \rightarrow 0} \frac{(3+h)^2 - 9}{h}$

29. Find $\lim_{h \rightarrow 0} \frac{\sin(x+h) - \sin x}{h}$

30. Find $\lim_{h \rightarrow 0} \frac{\frac{1}{x+h} - \frac{1}{x}}{h}$

PRACTICE PROBLEMS

Now try these problems. The answers are in chapter 21.

1. Is the function $f(x) = \begin{cases} x+7, & x < 2 \\ 9, & x = 2 \\ 3x+3, & x > 2 \end{cases}$ continuous at $x = 2$?

2. Is the function $f(x) = \begin{cases} 4x^2 - 2x, & x < 3 \\ 10x - 1, & x = 3 \\ 30, & x > 3 \end{cases}$ continuous at $x = 3$?

3. Is the function $f(x) = \begin{cases} 5x+7, & x < 3 \\ 7x+1, & x > 3 \end{cases}$ continuous at $x = 3$?

4. Is the function $f(x) = \sec x$ continuous everywhere?

5. Is the function $f(x) = \sec x$ continuous on the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$?

6. Is the function $f(x) = \sec x$ continuous on the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$?

7. For what value(s) of k is the function $f(x) = \begin{cases} 3x^2 - 11x - 4, & x \leq 4 \\ kx^2 - 2x - 1, & x > 4 \end{cases}$ continuous at $x = 4$?

8. For what value(s) of k is the function $f(x) = \begin{cases} -6x - 12, & x < -3 \\ k^2 - 5k, & x = -3 \\ 6, & x > -3 \end{cases}$ continuous at $x = -3$?

9. At what point is the removable discontinuity for the function $f(x) = \frac{x^2 + 5x - 24}{x^2 - x - 6}$?

10. Given the graph of $f(x)$ above, find:

(a) $\lim_{x \rightarrow -2} f(x)$

(b) $\lim_{x \rightarrow -2} f(x)$

(c) $\lim_{x \rightarrow 3} f(x)$

(d) $\lim_{x \rightarrow 3} f(x)$

(e) $f(3)$

(f) Any other discontinuities.

