

# 2.6 REVIEW EXERCISES for limits

Exer. 1-26: Find the limit, if it exists.

- 1  $\lim_{x \rightarrow 3} \frac{5x + 11}{\sqrt{x + 1}}$
- 2  $\lim_{x \rightarrow -2} \frac{6 - 7x}{(3 + 2x)^4}$
- 3  $\lim_{x \rightarrow -2} (2x - \sqrt{4x^2 + x})$
- 4  $\lim_{x \rightarrow 4} (x - \sqrt{16 - x^2})$
- 5  $\lim_{x \rightarrow 3/2} \frac{2x^2 + x - 6}{4x^2 - 4x - 3}$
- 6  $\lim_{x \rightarrow 2} \frac{3x^2 - x - 10}{x^2 - x - 2}$
- 7  $\lim_{x \rightarrow 2} \frac{x^4 - 16}{x^2 - x - 2}$
- 8  $\lim_{x \rightarrow 3^+} \frac{1}{x - 3}$
- 9  $\lim_{x \rightarrow 0^+} \frac{1}{\sqrt{x}}$
- 10  $\lim_{x \rightarrow 5} \frac{(1/x) - (1/5)}{x - 5}$
- 11  $\lim_{x \rightarrow 1/2} \frac{8x^3 - 1}{2x - 1}$
- 12  $\lim_{x \rightarrow 2} 5$
- 13  $\lim_{x \rightarrow 3^+} \frac{3 - x}{|3 - x|}$
- 14  $\lim_{x \rightarrow 2} \frac{\sqrt{x} - \sqrt{2}}{x - 2}$
- 15  $\lim_{h \rightarrow 0} \frac{(a + h)^4 - a^4}{h}$
- 16  $\lim_{h \rightarrow 0} \frac{(2 + h)^{-3} - 2^{-3}}{h}$
- 17  $\lim_{x \rightarrow -3} \sqrt[3]{\frac{x + 3}{x^3 + 27}}$
- 18  $\lim_{x \rightarrow 5/2} (\sqrt{5 - 2x} - x^2)$
- 19  $\lim_{x \rightarrow \infty} \frac{(2x - 5)(3x + 1)}{(x + 7)(4x - 9)}$
- 20  $\lim_{x \rightarrow \infty} \frac{2x + 11}{\sqrt{x + 1}}$
- 21  $\lim_{x \rightarrow \infty} \frac{6 - 7x}{(3 + 2x)^4}$
- 22  $\lim_{x \rightarrow \infty} \frac{x - 100}{\sqrt{x^2 + 100}}$
- 23  $\lim_{x \rightarrow 2/3} \frac{x^2}{4 - 9x^2}$
- 24  $\lim_{x \rightarrow 3/5} \frac{1}{5x - 3}$
- 25  $\lim_{x \rightarrow 0^+} \left( \sqrt{x} - \frac{1}{\sqrt{x}} \right)$
- 26  $\lim_{x \rightarrow 1} \frac{x - 1}{\sqrt{(x - 1)^2}}$

- 33  $\lim_{x \rightarrow \infty} \frac{3 - 2x}{x + 5}$
- 34  $\lim_{x \rightarrow \infty} \frac{5x + 1}{x - 1}$
- 35  $\lim_{x \rightarrow \infty} \frac{2x^2 - x + 5}{5x^2 + 6x - 1}$
- 36  $\lim_{x \rightarrow \infty} \frac{2x + 7}{x^2 - x}$
- 37  $\lim_{x \rightarrow \infty} \frac{2x^3 - 3x^2 + 1}{5x^3 - 4x + 7}$

- 38  $\lim_{x \rightarrow \infty} \frac{(3x - 2)(2x + 4)}{(2x + 1)(x + 2)}$
- 39  $\lim_{x \rightarrow \infty} \frac{3x^3 - 4x + 1}{(x^2 + 1)(x^2 - 1)}$
- 40  $\lim_{x \rightarrow \infty} \frac{3x\sqrt{x} + 3x + 1}{-x^2 - x + 11}$

- 41  $\lim_{r \rightarrow \infty} \frac{r^4 - r^2 + 1}{r^5 + r^3 - r}$
- 42  $\lim_{t \rightarrow \infty} \frac{6t^2 + 5t}{(1 - t)(2t - 3)}$
- 43  $\lim_{x \rightarrow \infty} \frac{\sqrt{1 + 4x^2}}{4 + x}$
- 44  $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 4x}}{4x + 1}$
- 45  $\lim_{x \rightarrow \infty} \frac{\sqrt[3]{x^2 + 8}}{x + 2}$
- 46  $\lim_{x \rightarrow \infty} \frac{\sqrt[3]{x^3 + 8}}{x + 2}$

Exer. 27-32: Sketch the graph of the piecewise-defined function  $f$  and, for the indicated value of  $a$ , find each limit, if it exists:

- (a)  $\lim_{x \rightarrow a^-} f(x)$  (b)  $\lim_{x \rightarrow a^+} f(x)$  (c)  $\lim_{x \rightarrow a} f(x)$

27  $f(x) = \begin{cases} 3x & \text{if } x \leq 2 \\ x^2 & \text{if } x > 2 \end{cases} \quad a = 2$

28  $f(x) = \begin{cases} x^3 & \text{if } x \leq 2 \\ 4 - 2x & \text{if } x > 2 \end{cases} \quad a = 2$

29  $f(x) = \begin{cases} \frac{1}{2 - 3x} & \text{if } x < -3 \\ \sqrt{x + 2} & \text{if } x \geq -3 \end{cases} \quad a = -3$

30  $f(x) = \begin{cases} \frac{9}{x^2} & \text{if } x \leq -3 \\ 4 + x & \text{if } x > -3 \end{cases} \quad a = -3$

31  $f(x) = \begin{cases} x^2 & \text{if } x < 1 \\ 2 & \text{if } x = 1 \\ 4 - x^2 & \text{if } x > 1 \end{cases} \quad a = 1$

32  $f(x) = \begin{cases} \frac{x^4 + x}{x} & \text{if } x \neq 0 \\ 2 & \text{if } x = 0 \end{cases} \quad a = 0$

\* Also review how to find equations of asymptotes & types of discontinuities.

Are #27-32 continuous? Prove why or why not using limit definition of continuity.