

Finding Limits Algebraically - Homework

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

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

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

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

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

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) $\lim_{x \rightarrow 1} \frac{2x-2}{x-1}$

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) $\lim_{x \rightarrow 1} \frac{x^3+x^2-5x+3}{x^3-3x+2}$

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) $\lim_{x \rightarrow 3} \frac{-x^2}{x^2-6x+9}$

Finding Limits Algebraically - Homework

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

$$\boxed{12}$$

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

$$\boxed{54}$$

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

$$\boxed{\frac{4}{3}}$$

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

$$\lim_{x \rightarrow 4} \frac{(x+4)(x-4)}{x-4} = 8$$

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

$$\lim_{x \rightarrow 4} \frac{(x+4)(x-4)}{x-4} = 8$$

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

$$\lim_{x \rightarrow -1} \frac{(x+5)(x+1)}{(x-4)(x+1)} = \frac{-4}{5}$$

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

$$\lim_{x \rightarrow 5^+} \frac{x}{x^2-25} = \infty \quad \lim_{x \rightarrow 5^-} \frac{x}{x^2-25} = -\infty$$

$$\lim_{x \rightarrow 5} \frac{x}{x^2-25} = DNE$$

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

$$\lim_{x \rightarrow 1^+} \frac{4}{(x-1)^2} = \infty \quad \lim_{x \rightarrow 1^-} \frac{4}{(x-1)^2} = \infty$$

$$\lim_{x \rightarrow 1} \frac{4}{(x-1)^2} = \infty$$

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

$$\boxed{\pi}$$

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

$$\boxed{-1}$$

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

$$\boxed{0}$$

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

$$\lim_{t \rightarrow -2} \frac{(t+2)(t^2-2t+4)}{t+2} = 12$$

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

$$\lim_{t \rightarrow -2} \frac{(t+2)(t^2-2t+4)}{t+2} = 12$$

14) $\lim_{x \rightarrow 1} \frac{x^3+x^2-5x+3}{x^3-3x+2}$

$$\lim_{x \rightarrow 1} \frac{(x-1)^2(x+3)}{(x-1)^2(x+2)} = \frac{4}{3}$$

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

$$\lim_{x \rightarrow 6^+} \frac{1}{x-6} = \infty \quad \lim_{x \rightarrow 6^-} \frac{1}{x-6} = -\infty$$

$$\lim_{x \rightarrow 6} \frac{1}{x-6} = DNE$$

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

$$\lim_{x \rightarrow 5^+} \frac{x}{|x-5|} = \infty \quad \lim_{x \rightarrow 5^-} \frac{x}{|x-5|} = \infty$$

$$\lim_{x \rightarrow 5} \frac{x}{|x-5|} = \infty$$

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

$$\boxed{8}$$

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

$$\boxed{11}$$

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

$$\lim_{x \rightarrow 1} \frac{2(x-1)}{x-1} = 2$$

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

$$\lim_{x \rightarrow 2} \frac{(x-2)^2}{(x-3)(x+2)} = 0$$

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

$$\lim_{x \rightarrow 2} \frac{(x-2)(x-2)}{(x+3)(x-2)} = 0$$

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

$$\lim_{x \rightarrow 3^+} \frac{x}{x-3} = \infty \quad \lim_{x \rightarrow 3^-} \frac{x}{x-3} = -\infty$$

$$\lim_{x \rightarrow 3} \frac{x}{x-3} = DNE$$

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

$$\lim_{x \rightarrow 4^+} \frac{3-x}{(x-4)(x+2)} = -\infty$$

$$\lim_{x \rightarrow 4^-} \frac{3-x}{(x-4)(x+2)} = \infty$$

$$\lim_{x \rightarrow 4} \frac{3-x}{(x-4)(x+2)} = DNE$$

21) $\lim_{x \rightarrow 3} \frac{-x^2}{x^2-6x+9}$

$$\lim_{x \rightarrow 3^+} \frac{-x^2}{(x-3)^2} = -\infty \quad \lim_{x \rightarrow 3^-} \frac{-x^2}{(x-3)^2} = -\infty$$

$$\lim_{x \rightarrow 3} \frac{-x^2}{(x-3)^2} = -\infty$$

$$22) f(x) = \begin{cases} x-1, & x \geq 3 \\ 2x-3, & x < 3 \end{cases} \quad \text{find } \lim_{x \rightarrow 3} f(x)$$

$$23) f(x) = \begin{cases} x^3-1, & x \geq -1 \\ 2x, & x < -1 \end{cases} \quad \text{find } \lim_{x \rightarrow -1} f(x)$$

$$24) f(x) = \begin{cases} \frac{x-2}{x-1}, & x \geq 1 \\ \frac{x}{x-1}, & x < 1 \end{cases} \quad \text{find } \lim_{x \rightarrow 1} f(x)$$

$$25) \lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}$$

$$26) \text{ Let } f(x) = \begin{cases} x^2 - 2x - 3, & x \neq 2 \\ k - 3, & x = 2 \end{cases}$$

find k such that $\lim_{x \rightarrow 2} f(x) = f(2)$

$$27) f(x) = \begin{cases} \frac{x^2 - 49}{x - 7}, & x \neq 7 \\ k^2 - 2, & x = 7 \end{cases}$$

find k such that $\lim_{x \rightarrow 7} f(x) = f(7)$

$$28) \lim_{x \rightarrow \infty} 6$$

$$29) \lim_{x \rightarrow \infty} (-2x + 11)$$

$$30) \lim_{x \rightarrow \infty} (3x^4 - 3x^3 + 5x^2 + 8x - 3)$$

$$31) \lim_{x \rightarrow \infty} \frac{2x-3}{4x+5}$$

$$32) \lim_{x \rightarrow \infty} \frac{7-3x^3}{2x^3+1}$$

$$33) \lim_{x \rightarrow \infty} \frac{2}{5x-3}$$

$$34) \lim_{x \rightarrow \infty} \frac{2x+30}{6x^{12}-5}$$

$$35) \lim_{x \rightarrow \infty} \frac{4x^4}{6x^3-19}$$

$$36) \lim_{x \rightarrow \infty} \frac{4x^2-3x-2-5x^3}{9x^2+9x+7}$$

$$37) \lim_{x \rightarrow \infty} \frac{x}{\sqrt{x^2+4}}$$

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

$$39) \lim_{x \rightarrow \infty} \frac{\sqrt{3x^2+x}}{x^2-1}$$

$$22) f(x) = \begin{cases} x-1, & x \geq 3 \\ 2x-3, & x < 3 \end{cases} \quad \text{find } \lim_{x \rightarrow 3} f(x)$$

$$\boxed{\begin{array}{l} \lim_{x \rightarrow 3^-} f(x) = 3 \quad \lim_{x \rightarrow 3^+} f(x) = 2 \\ \lim_{x \rightarrow 3} f(x) \text{ DNE} \end{array}}$$

$$23) f(x) = \begin{cases} x^3 - 1, & x \geq -1 \\ 2x, & x < -1 \end{cases} \quad \text{find } \lim_{x \rightarrow -1} f(x)$$

$$\boxed{\begin{array}{l} \lim_{x \rightarrow -1^-} f(x) = -2 \quad \lim_{x \rightarrow -1^+} f(x) = -2 \\ \lim_{x \rightarrow -1} f(x) = -2 \end{array}}$$

$$24) f(x) = \begin{cases} \frac{x-2}{x-1}, & x \geq 1 \\ \frac{x}{x-1}, & x < 1 \end{cases} \quad \text{find } \lim_{x \rightarrow 1} f(x)$$

$$\boxed{-\infty}$$

$$25) \lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}$$

$$\boxed{\begin{array}{l} \lim_{x \rightarrow 0} \left(\frac{\sqrt{x+4} - 2}{x} \right) \left(\frac{\sqrt{x+4} + 2}{\sqrt{x+4} + 2} \right) \\ \lim_{x \rightarrow 0} \left(\frac{x+4-4}{x(\sqrt{x+4} + 2)} \right) = \lim_{x \rightarrow 0} \frac{1}{(\sqrt{x+4} + 2)} = \frac{1}{4} \end{array}}$$

$$26) \text{ Let } f(x) = \begin{cases} x^2 - 2x - 3, & x \neq 2 \\ k - 3, & x = 2 \end{cases}$$

find k such that $\lim_{x \rightarrow 2} f(x) = f(2)$

$$\boxed{\begin{array}{l} 4 - 4 - 3 = k - 3 \\ k = 0 \end{array}}$$

$$27) f(x) = \begin{cases} \frac{x^2 - 49}{x - 7}, & x \neq 7 \\ k^2 - 2, & x = 7 \end{cases}$$

find k such that $\lim_{x \rightarrow 7} f(x) = f(7)$

$$\boxed{\begin{array}{l} \lim_{x \rightarrow 7} \frac{(x+7)(x-7)}{x-7} = \lim_{x \rightarrow 7} (x+7) = 14 \\ k^2 - 2 = 14 \Rightarrow k = \pm 4 \end{array}}$$

$$28) \lim_{x \rightarrow \infty} 6$$

$$\boxed{6}$$

$$29) \lim_{x \rightarrow \infty} (-2x + 11)$$

$$\boxed{-\infty}$$

$$30) \lim_{x \rightarrow \infty} (3x^4 - 3x^3 + 5x^2 + 8x - 3)$$

$$\boxed{\infty}$$

$$31) \lim_{x \rightarrow \infty} \frac{2x-3}{4x+5}$$

$$\boxed{\frac{1}{2}}$$

$$32) \lim_{x \rightarrow \infty} \frac{7-3x^3}{2x^3+1}$$

$$\boxed{\frac{-3}{2}}$$

$$33) \lim_{x \rightarrow \infty} \frac{2}{5x-3}$$

$$\boxed{0}$$

$$34) \lim_{x \rightarrow \infty} \frac{2x+30}{6x^{12}-5}$$

$$\boxed{0}$$

$$35) \lim_{x \rightarrow \infty} \frac{4x^4}{6x^3-19}$$

$$\boxed{\infty}$$

$$36) \lim_{x \rightarrow \infty} \frac{4x^2 - 3x - 2 - 5x^3}{9x^2 + 9x + 7}$$

$$\boxed{\infty}$$

$$37) \lim_{x \rightarrow \infty} \frac{x}{\sqrt{x^2+4}}$$

$$\boxed{1}$$

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

$$\boxed{-1}$$

$$39) \lim_{x \rightarrow \infty} \frac{\sqrt{3x^2+x}}{x^2-1}$$

$$\boxed{0}$$