

Limits Day 2 Worksheet (Sections 2.3, 2.5, 4.5)**NO Calculator!**

Find each limit.

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

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

3) $\lim_{x \rightarrow 7} \frac{5x}{\sqrt{x+2}}$

4) $\lim_{x \rightarrow \frac{\pi}{2}} \sin x$

5) $\lim_{x \rightarrow \frac{5\pi}{6}} \sin x$

6) $\lim_{x \rightarrow 3} \tan\left(\frac{\pi x}{4}\right)$

Use the information given to evaluate the limits.

7) $\lim_{x \rightarrow c} f(x) = 4$

a) $\lim_{x \rightarrow c} [f(x)]^3$

b) $\lim_{x \rightarrow c} \sqrt{f(x)}$

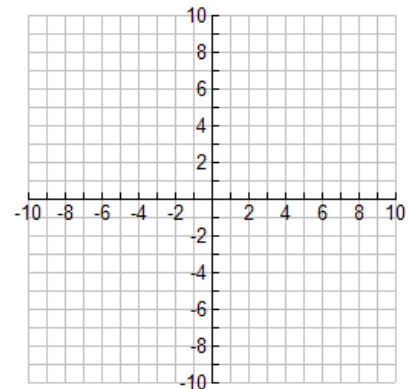
c) $\lim_{x \rightarrow c} [3f(x)]$

d) $\lim_{x \rightarrow c} [f(x)]^{3/2}$

8) Factor and simplify $f(x) = \frac{-2x^2 + x}{x}$. Then graph and find the given limits.

a) $\lim_{x \rightarrow 0} f(x)$

b) $\lim_{x \rightarrow -1} f(x)$



Find each limit (if it exists).

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

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

11) $\lim_{\Delta x \rightarrow 0} \frac{2(x + \Delta x) - 2x}{\Delta x}$

12) $\lim_{x \rightarrow 0} \frac{\sin x}{5x}$

13) $\lim_{x \rightarrow 0} \frac{\sin x(1 - \cos x)}{2x^2}$

14) $\lim_{x \rightarrow 0} \frac{\cos x \tan x}{x}$

15) $\lim_{x \rightarrow 0} \frac{\sin^2 x}{x}$

Find the vertical asymptotes (if any) of the graph of the function.

$$16) f(x) = \frac{x^2 - 2}{x^2 - x - 2}$$

$$17) f(x) = \frac{x - 1}{x^2 + 1}$$

$$18) f(x) = \frac{x^2 - 2x - 15}{x^3 - 5x^2 + x - 5}$$

Determine whether the graph of the function has a vertical asymptote or a removable discontinuity at $x = -1$.

$$19) f(x) = \frac{x^2 - 1}{x + 1}$$

$$20) f(x) = \frac{x^2 + 1}{x + 1}$$

Find each limit.

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

$$22) \lim_{x \rightarrow 1} \frac{x^2 - x}{(x^2 + 1)(x - 1)}$$

$$23) \lim_{x \rightarrow 5^-} \frac{1}{x^2 - 25}$$

$$24) \lim_{x \rightarrow 1^+} \frac{2 + x}{1 - x}$$

$$25) \lim_{x \rightarrow -2^+} \frac{1}{x + 2}$$

$$26) \lim_{x \rightarrow -2^-} \frac{1}{x + 2}$$

27) Given $f(x) = 5x^3 - 3x^2 + 10$, find each limit.

a) $\lim_{x \rightarrow \infty} \frac{f(x)}{x^2}$

b) $\lim_{x \rightarrow \infty} \frac{f(x)}{x^3}$

c) $\lim_{x \rightarrow \infty} \frac{f(x)}{x^4}$

28) Find each limit, if possible.

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

b) $\lim_{x \rightarrow \infty} \frac{x^2 + 2}{x^2 - 1}$

c) $\lim_{x \rightarrow \infty} \frac{x^2 + 2}{x - 1}$

Find each limit.

29) $\lim_{x \rightarrow \infty} \frac{2x - 1}{3x + 2}$

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

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