

Limit Problems of $\frac{0}{0}$

(intro to continuity)

Compute algebraically:

1. $\lim_{x \rightarrow 3} \frac{5x^2 - 8x - 13}{x^2 - 5}$

11. $\lim_{x \rightarrow 0} \frac{x^4 + 5x - 3}{2 - \sqrt{x^2 + 4}}$

2. $\lim_{x \rightarrow 2} \frac{3x^2 - x - 10}{x^2 - 4}$

12. $\lim_{x \rightarrow 1} \frac{x^3 - 1}{(x-1)^2}$

3. $\lim_{x \rightarrow 3} \frac{x^4 - 81}{2x^2 - 5x - 3}$

13. $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\tan 2x}{x - \frac{\pi}{2}}$

4. $\lim_{x \rightarrow -2} \frac{\frac{1}{x} + \frac{1}{2}}{x^3 + 8}$

14. $f(x) = \begin{cases} \frac{1}{x^2}, & x < -1 \\ 2, & -1 \leq x < 1 \\ 3, & x = 1 \\ x+1, & 1 < x \leq 2 \\ \frac{-1}{(x-2)^2}, & x > 2 \end{cases}$

5. $\lim_{x \rightarrow 4} \frac{3 - \sqrt{x+5}}{x-4}$

6. $\lim_{x \rightarrow 27} \frac{x-27}{x^{\frac{1}{3}} - 3}$

A. sketch graph of f.

B. a. $\lim_{x \rightarrow -1^+} f(x)$

g. $\lim_{x \rightarrow 2^+} f(x)$

7. $\lim_{x \rightarrow 1} \frac{x^{\frac{1}{3}} - 1}{x^{\frac{1}{4}} - 1}$

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

h. $\lim_{x \rightarrow 2^-} f(x)$

8. $\lim_{x \rightarrow 0} \frac{\sin(5x)}{3x}$

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

i. $\lim_{x \rightarrow 2} f(x)$

9. $\lim_{x \rightarrow 0} \frac{\cos(2x) - 1}{\cos x - 1}$

d. $\lim_{x \rightarrow 1^+} f(x)$

j. $\lim_{x \rightarrow -3} f(x)$

10. $\lim_{x \rightarrow 0} \frac{x^3 - 7x}{x^3}$

e. $\lim_{x \rightarrow 1^-} f(x)$

k. $\lim_{x \rightarrow 5} f(x)$

l. $\lim_{x \rightarrow 1.5} f(x)$

15.

$$f(x) = \begin{cases} a+bx, & x > 2 \\ 3, & x = 2 \\ b-ax^2, & x < 2 \end{cases}$$

Find the values of the constants a and b so that

$\lim_{x \rightarrow 2} f(x)$ exists and is equal to $f(2)$.

$$\left. \begin{aligned} x < 2 \\ x = 2 \\ x > 2 \end{aligned} \right\} = f(x)$$