

1. Find  $\lim_{x \rightarrow -2^-} \frac{x^2 - 4x + 4}{\sqrt{x^2 - 4x - 12}}$

2. Find  $\lim_{x \rightarrow \frac{4\pi}{3}} \frac{\cot 2x}{\sec x}$

3. Find  $\lim_{x \rightarrow \pi} \frac{2x \sec 3x}{\tan 4x}$

4. Find  $\lim_{x \rightarrow -\infty} \frac{(2x - 3)(2x - 7)}{\sqrt{16x^4 + 25x^3 + 121x^2}}$

5. Find  $\lim_{x \rightarrow (\frac{-1}{2})^+} \frac{5x}{\lceil 2x \rceil}$  (the denominator is a variation of the greatest integer function)

6. Find  $\lim_{x \rightarrow \frac{-2}{3}} \frac{6x^2 - 5x - 6}{12x^2 + 5x - 2}$

7. Find  $\lim_{x \rightarrow 0^-} \frac{x + \sin 2x}{3 \sin 3x}$

8. Find  $\lim_{x \rightarrow 3^+} \frac{x^2 - 5x + 6}{\frac{1}{3} - \frac{1}{x}}$

9. Find the slope of the curve  $y = x^2 - x + 3$  at the point  $(-2, 9)$ , and do not use any shortcuts.

10. Find the average rate of change of the function  $f(x) = \operatorname{arccot} x$  on the interval  $[-\sqrt{3}, 1]$

11. Find the equation of the line tangent to the curve for the function  $f(x) = |3 - 2x|$  at  $(1, 1)$  and you may use shortcuts.

12. If  $f(x) = \frac{-1}{x^2 - 3}$  and  $g(x) = \sqrt{x^2 - 1}$ , find  $f(g(x))$ , and indicate the domain and range.

13. For the function  $y = \sqrt[5]{|2x + 3|} + \log_2|x + 5| + 4^{-x}$ , find

(a) a simple basic function right end behavior model

(b) a simple basic function left end behavior model

14. Give an example of a function that has a jump discontinuity at  $x = 2$  and a removable discontinuity at  $x = -3$  (provide a definition for a function)

15. Find  $\lim_{x \rightarrow 9^-} \frac{81 - x^2}{\sqrt{x} - 3}$

16. Sketch a graph for a function that satisfies the following conditions

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

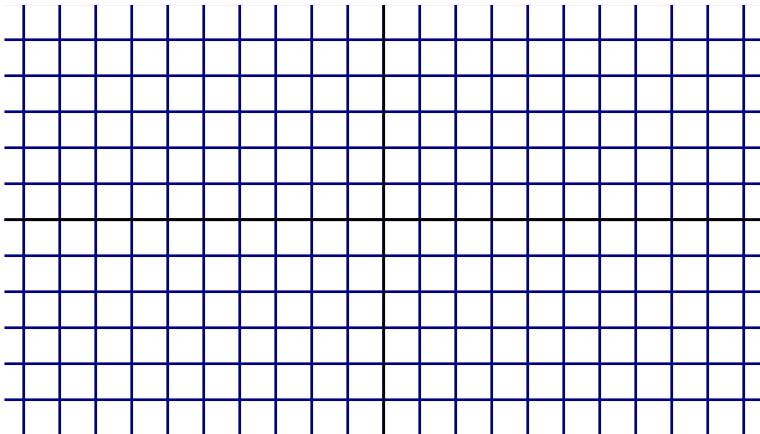
$$\lim_{x \rightarrow 2} f(x) = 2$$

$$\lim_{x \rightarrow -\infty} f(x) = 3$$

$$\lim_{x \rightarrow -1^-} f(x) = 0$$

$$f(2) = -1$$

$$\lim_{x \rightarrow 3^+} f(x) = -\infty$$



17. Find  $\lim_{x \rightarrow -\infty} 2^x x^2 \cos x$

18. Determine whether or not the function  $f(x) = \sqrt{25 - x^2}$  is continuous at  $x = -5$ , using the definition for continuity.

19. Find the slope of the curve  $y = \sqrt{x}$  at the point  $(9, 3)$  and do not use any shortcuts.

20. The graph of  $f(x)$  is shown. Draw the graph of  $-f(2x + 4) - 1$ , clearly showing the scale on each of the axes.

