

CALCULUS
WORKSHEET 1 ON LIMITS

1. Explain in your own words what is meant by the equation

$$\lim_{x \rightarrow 2} f(x) = 5.$$

Is it possible for this statement to be true and yet $f(2) = 3$? Explain.

2. Explain what it means to say that

$$\lim_{x \rightarrow 1^-} f(x) = 3 \text{ and } \lim_{x \rightarrow 1^+} f(x) = 7.$$

In this situation, it is possible that $\lim_{x \rightarrow 1} f(x)$ exists?

3. Explain the meaning of each of the following.

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

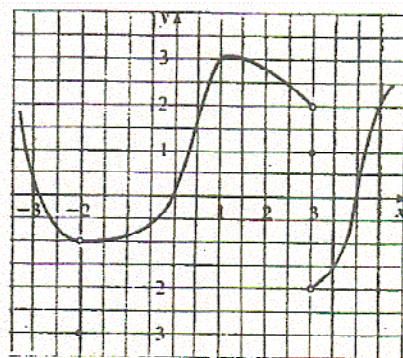
(b) $\lim_{x \rightarrow 4^+} f(x) = -\infty$

4. For the function f whose graph is given, state the value of the given quantity, if it exists. If it does not exist, explain why.

(a) $\lim_{x \rightarrow 1} f(x) =$ (b) $\lim_{x \rightarrow 3^-} f(x) =$ (c) $\lim_{x \rightarrow 3^+} f(x) =$

(d) $\lim_{x \rightarrow 3} f(x) =$ (e) $f(3) =$ (f) $\lim_{x \rightarrow -2^-} f(x) =$

(g) $\lim_{x \rightarrow -2^+} f(x) =$ (h) $\lim_{x \rightarrow -2} f(x) =$ (i) $f(-2) =$



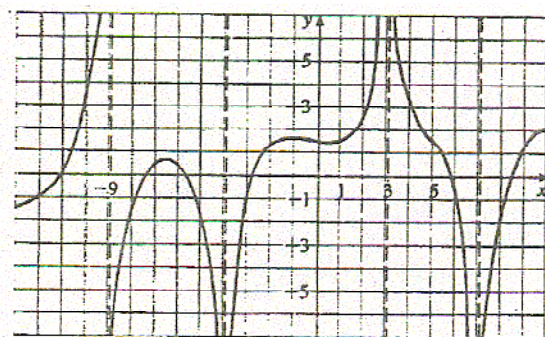
5. For the function f whose graph is shown, state the following.

(a) $\lim_{x \rightarrow 3} f(x) =$ (b) $\lim_{x \rightarrow 7} f(x) =$

(c) $\lim_{x \rightarrow 4} f(x) =$ (d) $\lim_{x \rightarrow 9^-} f(x) =$

(e) $\lim_{x \rightarrow 9^+} f(x) =$

- (f) The equations of the vertical asymptotes

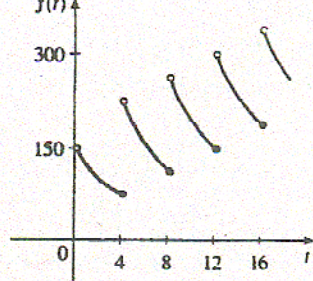


TURN →>>>

6. A patient receives a 150-mg injection of a drug every four hours. The graph shows the amount $f(t)$ of the drug in the bloodstream after t hours. Find

$$\lim_{t \rightarrow 12^-} f(t) \text{ and } \lim_{t \rightarrow 12^+} f(t)$$

and explain the significance of these one-sided limits.



7. Sketch the graph of the function $f(x) = \frac{1}{(1+2^{1/x})}$ and state

the value of each limit, if it exists. If it does not exist, explain why.

(a) $\lim_{x \rightarrow 0^-} f(x) =$ (b) $\lim_{x \rightarrow 0^+} f(x) =$ (c) $\lim_{x \rightarrow 0} f(x) =$

Sketch the graph of the following function and use it to determine the values of a for which $\lim_{x \rightarrow a} f(x)$ exists.

$$f(x) = \begin{cases} 2-x, & x < -1 \\ x, & -1 \leq x < 1 \\ (x-1)^2, & x \geq 1 \end{cases}$$

Fill in the table for the following functions to find the given limit.

9. $f(x) = \frac{\sin(3x)}{x}$

x	-0.1	-0.01	-0.001	0	0.001	0.01	0.1
$f(x)$							

$$\lim_{x \rightarrow 0} \frac{\sin(3x)}{x} =$$

10. $g(x) = \frac{1 - \cos x}{x^2}$

x	-0.1	-0.01	-0.001	0	0.001	0.01	0.1
$g(x)$							

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2} =$$