

## Section 2-5 : Computing Limits

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For problems 1 – 20 evaluate the limit, if it exists.

1.  $\lim_{x \rightarrow -9} (1 - 4x^3)$

2.  $\lim_{y \rightarrow 1} (6y^4 - 7y^3 + 12y + 25)$

3.  $\lim_{t \rightarrow 0} \frac{t^2 + 6}{t^2 - 3}$

4.  $\lim_{z \rightarrow 4} \frac{6z}{2 + 3z^2}$

5.  $\lim_{w \rightarrow -2} \frac{w + 2}{w^2 - 6w - 16}$

6.  $\lim_{t \rightarrow -5} \frac{t^2 + 6t + 5}{t^2 + 2t - 15}$

7.  $\lim_{x \rightarrow 3} \frac{5x^2 - 16x + 3}{9 - x^2}$

8.  $\lim_{z \rightarrow 1} \frac{10 - 9z - z^2}{3z^2 + 4z - 7}$

9.  $\lim_{x \rightarrow -2} \frac{x^3 + 8}{x^2 + 8x + 12}$

10.  $\lim_{t \rightarrow 8} \frac{t(t-5) - 24}{t^2 - 8t}$

11.  $\lim_{w \rightarrow -4} \frac{w^2 - 16}{(w-2)(w+3) - 6}$

12.  $\lim_{h \rightarrow 0} \frac{(2+h)^3 - 8}{h}$

13.  $\lim_{h \rightarrow 0} \frac{(1+h)^4 - 1}{h}$

$$14. \lim_{t \rightarrow 25} \frac{5 - \sqrt{t}}{t - 25}$$

$$15. \lim_{x \rightarrow 2} \frac{x - 2}{\sqrt{2} - \sqrt{x}}$$

$$16. \lim_{z \rightarrow 6} \frac{z - 6}{\sqrt{3z - 2} - 4}$$

$$17. \lim_{z \rightarrow -2} \frac{3 - \sqrt{1 - 4z}}{2z + 4}$$

$$18. \lim_{t \rightarrow 3} \frac{3 - t}{\sqrt{t + 1} - \sqrt{5t - 11}}$$

$$19. \lim_{x \rightarrow 7} \frac{\frac{1}{7} - \frac{1}{x}}{x - 7}$$

$$20. \lim_{y \rightarrow -1} \frac{\frac{1}{4 + 3y} + \frac{1}{y}}{y + 1}$$

21. Given the function

$$f(x) = \begin{cases} 15 & x < -4 \\ 6 - 2x & x \geq -4 \end{cases}$$

Evaluate the following limits, if they exist.

(a)  $\lim_{x \rightarrow -7} f(x)$

(b)  $\lim_{x \rightarrow -4} f(x)$

22. Given the function

$$g(t) = \begin{cases} t^2 - t^3 & t < 2 \\ 5t - 14 & t \geq 2 \end{cases}$$

Evaluate the following limits, if they exist.

(a)  $\lim_{t \rightarrow -3} g(t)$

(b)  $\lim_{t \rightarrow 2} g(t)$

23. Given the function

$$h(w) = \begin{cases} 2w^2 & w \leq 6 \\ w-8 & w > 6 \end{cases}$$

Evaluate the following limits, if they exist.

(a)  $\lim_{w \rightarrow 6} h(w)$

(b)  $\lim_{w \rightarrow 2} h(w)$

24. Given the function

$$g(x) = \begin{cases} 5x + 24 & x < -3 \\ x^2 & -3 \leq x < 4 \\ 1 - 2x & x \geq 4 \end{cases}$$

Evaluate the following limits, if they exist.

(a)  $\lim_{x \rightarrow -3} g(x)$

(b)  $\lim_{x \rightarrow 0} g(x)$

(c)  $\lim_{x \rightarrow 4} g(x)$

(d)  $\lim_{x \rightarrow 12} g(x)$

For problems 25 – 30 evaluate the limit, if it exists.

25.  $\lim_{z \rightarrow -10} (|t + 10| + 3)$

26.  $\lim_{x \rightarrow 4} (9 + |8 - 2x|)$

27.  $\lim_{h \rightarrow 0} \frac{|h|}{h}$

28.  $\lim_{t \rightarrow 2} \frac{2-t}{|t-2|}$

29.  $\lim_{w \rightarrow -5} \frac{|2w+10|}{w+5}$

30.  $\lim_{x \rightarrow 4} \frac{|x-4|}{x^2-16}$

31. Given that  $3 + 2x \leq f(x) \leq x - 1$  for all  $x$  determine the value of  $\lim_{x \rightarrow -4} f(x)$ .

32. Given that  $\sqrt{x+7} \leq f(x) \leq \frac{x-1}{2}$  for all  $x$  determine the value of  $\lim_{x \rightarrow 9} f(x)$ .

33. Use the Squeeze Theorem to determine the value of  $\lim_{x \rightarrow 0} x^4 \cos\left(\frac{3}{x}\right)$ .

34. Use the Squeeze Theorem to determine the value of  $\lim_{x \rightarrow 0} x \cos\left(\frac{1}{x}\right)$ .

35. Use the Squeeze Theorem to determine the value of  $\lim_{x \rightarrow 1} (x-1)^2 \cos\left(\frac{1}{x-1}\right)$ .

