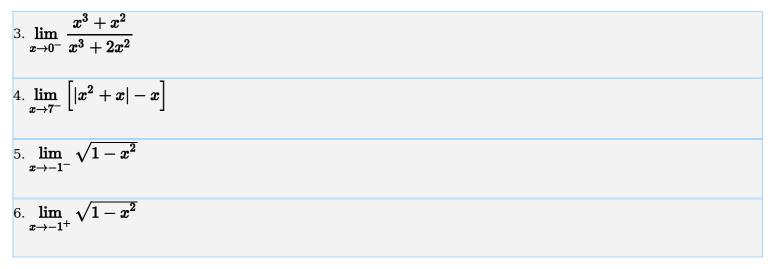
## **Calculus/Limits/Exercises**

## **Basic Limit Exercises**

1. 
$$\lim_{x \to 2} \left[ 4x^2 - 3x + 1 \right]$$
  
2. 
$$\lim_{x \to 5} \left[ x^2 \right]$$

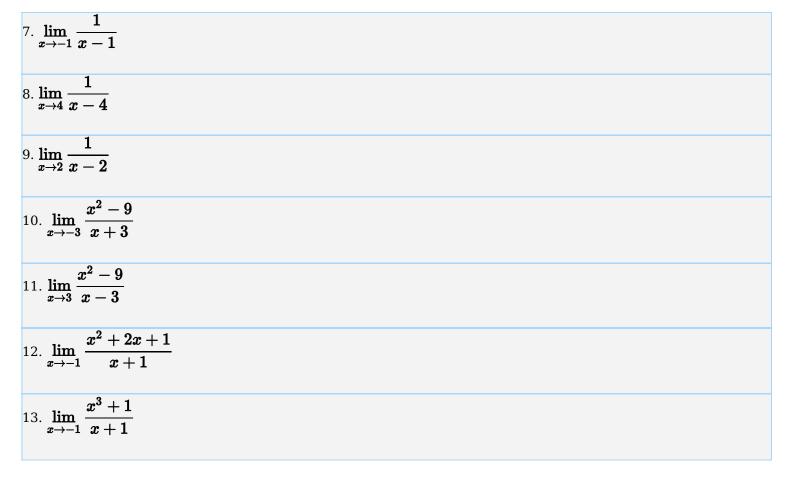
### **One-Sided** Limits

Evaluate the following limits or state that the limit does not exist.



## **Two-Sided Limits**

Evaluate the following limits or state that the limit does not exist.



$$14. \lim_{x \to 4} \frac{x^2 + 5x - 36}{x^2 - 16}$$

$$15. \lim_{x \to 2} \frac{x - 25}{\sqrt{x} - 5}$$

$$16. \lim_{x \to 4} \frac{|x|}{x}$$

$$17. \lim_{x \to 4} \frac{1}{(x - 2)^2}$$

$$18. \lim_{x \to 3} \frac{\sqrt{x^2 + 16}}{x - 3}$$

$$19. \lim_{x \to -2} \frac{3x^2 - 8x - 3}{2x^2 - 18}$$

$$20. \lim_{x \to -2} \frac{x^2 + 2x + 1}{x^2 - 2x + 1}$$

$$21. \lim_{x \to -3} \frac{x + 3}{x^2 - 9}$$

$$22. \lim_{x \to -1} \frac{x + 1}{x^2 + x}$$

$$23. \lim_{x \to +1} \frac{1}{x^2 + 1}$$

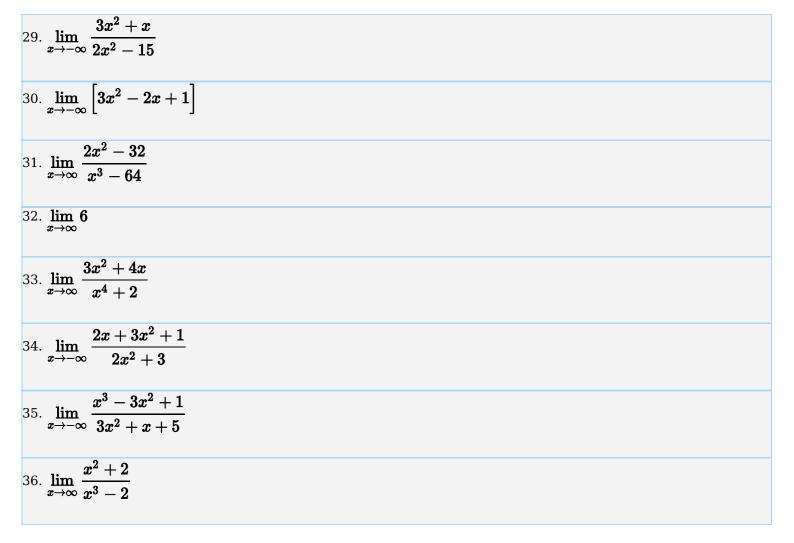
$$24. \lim_{x \to 1} \left[x^2 + 5x - \frac{1}{2 - x}\right]$$

$$25. \lim_{x \to +1} \frac{x^2 - 1}{x^2 + 2x - 3}$$

# Limits to Infinity

Evaluate the following limits or state that the limit does not exist.

27. 
$$\lim_{x \to \infty} \frac{-x + \pi}{x^2 + 3x + 2}$$
  
28. 
$$\lim_{x \to -\infty} \frac{x^2 + 2x + 1}{3x^2 + 1}$$



#### **Limits of Piecewise Functions**

Evaluate the following limits or state that the limit does not exist.

37. Consider the function

$$f(x)=egin{cases} (x-2)^2 & ext{if } x<2\ x-3 & ext{if } x\geq2 \end{cases}$$
a.  $\lim_{x o 2^-}f(x)$ 

b. 
$$\lim_{x \to 2^+} f(x)$$
  
c.  $\lim_{x \to 2} f(x)$ 

38. Consider the function

С

$$g(x) = egin{cases} -2x+1 & ext{if } x \leq 0 \ x+1 & ext{if } 0 < x < 4 \ x^2+2 & ext{if } x \geq 4 \end{cases}$$
a.  $\lim_{x o 4^+} g(x)$ b.  $\lim_{x o 4^-} g(x)$ c.  $\lim_{x o 0^+} g(x)$ 

d. 
$$\lim_{x \to 0^-} g(x)$$
e.  $\lim_{x \to 0} g(x)$ f.  $\lim_{x \to 1} g(x)$ 

39. Consider the function

$$h(x) = egin{cases} 2x-3 & ext{if } x < 2 \ 8 & ext{if } x = 2 \ -x+3 & ext{if } x > 2 \end{cases}$$
a.  $\lim_{x o 0} h(x)$   
b.  $\lim_{x o 2^-} h(x)$   
c.  $\lim_{x o 2^+} h(x)$ 

d. 
$$\lim_{x 
ightarrow 2} h(x)$$

С

#### **External Links**

- Limits 1 exercise at Khan Academy (http://www.khanacademy.org/exercise/limits\_1)
- Limits 2 exercise at Khan Academy (http://www.khanacademy.org/exercise/limits\_2)

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