Key

Limits Algebraically

Find the following limits:

1. $\lim_{x\to 2}(x^2-x+1)$ $2^2-2+1=3$

2. $\lim_{x\to 1}\left(\frac{2x+1}{3x-2}\right)=\frac{3}{1}=3$

3. $\lim_{x\to 1}(\sqrt{10x-1})=3$

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

5. $\lim_{x\to 2}\left(\frac{x^2-x-2}{x-2}\right)=\frac{0}{0}$ $\frac{(x-2)(x+1)}{(x-2)}=3$

6. $\lim_{x\to 4}\left(\frac{\sqrt{x}-2}{x-4}\right)=\frac{0}{0}$ $\frac{(\sqrt{x}-2)(\sqrt{x}+2)}{(x-4)(\sqrt{x}+2)}=\frac{(x-4)}{(x-4)(\sqrt{x}+2)}=\frac{1}{4}$

7. $\lim_{x\to -3}\left(\frac{x^2-9}{x+3}\right)=\frac{0}{0}$ $\frac{(x+3)(x-3)}{(x+3)}=-6$

8. $\lim_{x\to -3}\left(\frac{x^2-9}{2x^2+7x+3}\right)=\frac{0}{0}$ $\frac{(x+3)(x-3)}{(x+3)(2x+1)}=\frac{-6}{-5}=\frac{6}{5}$

9. $\lim_{x\to 9}\left(\frac{\sqrt{x}-3}{x-9}\right)=\frac{0}{0}$ $\frac{(\sqrt{x}-3)(\sqrt{x}+3)}{(\sqrt{x}+3)(x-9)}=\frac{(x-9)}{(\sqrt{x}+3)(x-9)}=\frac{1}{6}$

10. $\lim_{h\to 0}\left(\frac{(1+h)^2-1^2}{h}\right)=\frac{0}{0}$ $\frac{1+2h+h^2-1}{h}=\frac{h(2+h)}{h}=2$

11. $\lim_{h\to 0}\left(\frac{(3+h)^2-3^2}{h}\right)=\frac{0}{0}$ $\frac{9+6h+h^2-9}{h}=\frac{h(6+h)}{h}=6$

12. $\lim_{h\to 0}\left(\frac{(x+h)^2-x^2}{h}\right)=\frac{0}{0}$ $\frac{x^2+2hx+h^2-x^2}{h}=\frac{h(2x+h)}{h}=2x$

Find the following limits for the piecewise function: $f(x)=\begin{cases} x+1, & x<2 \\ x^2-2, & 2<x<4 \\ \sqrt{x+5}, & x\geq 4 \end{cases}$

13. $\lim_{x\to 1^+} f(x)=2$

14. $\lim_{x\to 1^-} f(x)=2$

15. $\lim_{x\to 1} f(x)=2$

16. $f(1)=2$

17. $\lim_{x\to 2^+} f(x)=2$

18. $\lim_{x\to 2^-} f(x)=3$

19. $\lim_{x\to 2} f(x)=$ DNE

20. $f(2)=$ DNE

21. $\lim_{x\to 3^+} f(x)=7$

22. $\lim_{x\to 3^-} f(x)=7$

23. $\lim_{x\to 3} f(x)=7$

24. $f(3)=7$

25. $\lim_{x\to 4^+} f(x)=3$

26. $\lim_{x\to 4^-} f(x)=14$

27. $\lim_{x\to 4} f(x)=$ DNE

28. $f(4)=3$

Limits Algebraically

Find the following limits:

1. $\lim_{x\to 2}(x^2-x+1)$
2. $\lim_{x\to 1}\left(\frac{2x+1}{3x-2}\right)$
3. $\lim_{x\to 1}(\sqrt{10x-1})$
4. $\lim_{x\to 1}\left(\frac{x^2-x-2}{x-2}\right)$
5. $\lim_{x\to 2}\left(\frac{x^2-x-2}{x-2}\right)$
6. $\lim_{x\to 4}\left(\frac{\sqrt{x}-2}{x-4}\right)$
7. $\lim_{x\to -3}\left(\frac{x^2-9}{x+3}\right)$
8. $\lim_{x\to -3}\left(\frac{x^2-9}{2x^2+7x+3}\right)$
9. $\lim_{x\to 9}\left(\frac{\sqrt{x}-3}{x-9}\right)$
10. $\lim_{h\to 0}\left(\frac{(1+h)^2-1^2}{h}\right)$
11. $\lim_{h\to 0}\left(\frac{(3+h)^2-3^2}{h}\right)$
12. $\lim_{h\to 0}\left(\frac{(x+h)^2-x^2}{h}\right)$

Find the following limits for the piecewise function: $f(x)=\begin{cases} x+1, & x<2 \\ x^2-2, & 2<x<4 \\ \sqrt{x+5}, & x\geq 4 \end{cases}$

13. $\lim_{x\to 1^+} f(x)$
14. $\lim_{x\to 1^-} f(x)$
15. $\lim_{x\to 1} f(x)$
16. $f(1)$
17. $\lim_{x\to 2^+} f(x)$
18. $\lim_{x\to 2^-} f(x)$
19. $\lim_{x\to 2} f(x)$
20. $f(2)$
21. $\lim_{x\to 3^+} f(x)$
22. $\lim_{x\to 3^-} f(x)$
23. $\lim_{x\to 3} f(x)$
24. $f(3)$
25. $\lim_{x\to 4^+} f(x)$
26. $\lim_{x\to 4^-} f(x)$
27. $\lim_{x\to 4} f(x)$
28. $f(4)$