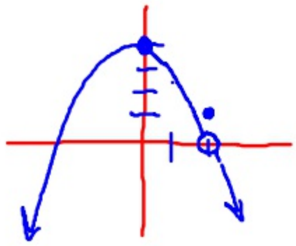
Determine the limits for the piecewise function given below

51A. $f(x)=\begin{cases} 2-x & x<3 \\ \frac{x}{3}+1 & x>3 \end{cases}$ Left Right

a) $\lim_{x\to3^-} f(x) = 2-3 = -1$ b) $\lim_{x\to3^+} f(x) = \frac{3}{3}+1 = 2$ c) $\lim_{x\to3} f(x) =$ DNE d) $f(3) =$ DNE

54A. $f(x)=\begin{cases} 4-x^2 & x\neq2 \\ 1 & x=2 \end{cases}$ $\left.\begin{matrix}\text{Parabola} \\ \text{Point}\end{matrix}\right\}$ Removeable

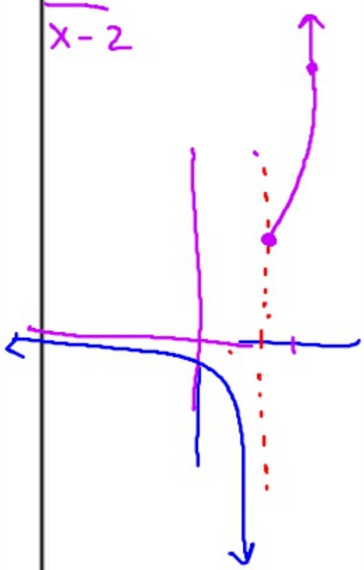
a) $\lim_{x\to2^-} f(x) = 4-2^2 = 0$ b) $\lim_{x\to2^+} f(x) = 0$ c) $\lim_{x\to2} f(x) = 0$ d) $f(2) = 1$



53A. $f(x)=\begin{cases} \frac{1}{x-2} & x<2 \\ x^3 & x\geq2 \end{cases}$ Left Right

a) $\lim_{x\to2^-} f(x) = -\infty$ b) $\lim_{x\to2^+} f(x) = 8$ c) $\lim_{x\to2} f(x) =$ DNE d) $f(2) = 8$

$\frac{1}{x-2}$



Determine the Limit by substitution

7A) $\lim_{x\to -1} 2x^2(5x+2) = -6$

$2(-1)^2(5(-1)+2)$

$2(-3)$

13A) $\lim_{x\to 30} (x-3)^{1/3} = 3$

$(30-3)^{1/3} = \sqrt[3]{27}$

Determine the limit algebraically and support graphically.

20A) $\lim_{x\to 4} \dfrac{x^2-3x-4}{x^2-16} = \dfrac{4^2-3(4)-4}{4^2-16} = \dfrac{16-12-4}{16-16} = \dfrac{0}{0}$

$\lim_{x\to 4} \dfrac{x^2-3x-4}{x^2-16} = \dfrac{\cancel{(x-4)}(x+1)}{\cancel{(x-4)}(x+4)} = \dfrac{5}{8}$

Removeable

$\boxed{\text{Do some Algebra}}$

22A) $\lim_{x\to 0} \dfrac{\frac{1}{x+3} - \frac{1}{3}}{x} =$

common denominator

$\lim_{x\to 0} \dfrac{\frac{(3)\,1}{(3)(x+3)} - \frac{1}{3}\frac{(x+3)}{(x+3)}}{x} = \dfrac{0}{0}$

$\lim_{x\to 0} \dfrac{\frac{3}{3(x+3)} - \frac{(x+3)}{3(x+3)}}{x}$

$\lim_{x\to 0} \dfrac{\frac{3-x-3}{3(x+3)}}{x} = \dfrac{\left(\frac{-x}{3(x+3)}\right)}{\left(\frac{x}{1}\right)} = \dfrac{-\cancel{x}}{3\cancel{x}(x+3)}$

$\lim_{x\to 0} \dfrac{-1}{3(x+3)} = \dfrac{-1}{3(0+3)} = -\dfrac{1}{9}$

DNE | ∞ | $-\infty$

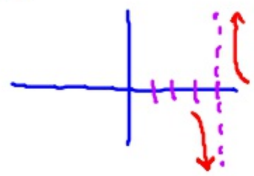
$\frac{12}{0}$ → asymptotes

$\frac{0}{6} = 0$

$\frac{0}{0}$ → Do more algebra

Determine the limit by substitution and support graphically.

30*A*) $\lim_{x\to 4} \frac{x^2-4}{x^2-16} = \frac{4^2-4}{4^2-16} = \frac{16-4}{16-16} = \frac{12}{0}$ = DNE



$\lim_{x\to 4} \frac{x^2-4}{x^2-16}$

Left $x=4$ $y \to -\infty$ Right $x=4$ $y \to \infty$

$x=3$ $y=\frac{5}{-7}$ $x=5$ $y=\frac{21}{9}$

Use properties of limits to determine each limit

Assume that $\lim_{x\to 1} f(x) = 10$ and $\lim_{x\to 1} g(x) = 5$

A) $\lim_{x\to 1}(f(x)+3) = 10 + 3$

$\lim_{x\to 1} f(x) + \lim_{x\to 1} 3$

B) $\lim_{x\to 1}(xg(x)) = (1)g(1) = 1(5) = 5$

C) $\lim_{x\to 1}(f^2(x)) = 10^2 = 100$

D) $\lim_{x\to 1} \frac{f(x)}{g(x)+2} = \frac{10}{5+2} = \frac{10}{7}$