

$$f(x) = \begin{cases} \frac{2}{x-2}, & x \leq -1 \\ \frac{x^2-1}{x+1}, & -1 < x < 2 \\ \frac{3x}{x-4}, & x \geq 2 \end{cases}$$

Find all discontinuities

$\frac{2}{x-2}$ $x=2$ is not in the interval

$\frac{x^2-1}{x+1}$ $x=-1$ is not in the interval

$\frac{3x}{x-4}$ $x=4$ is a discontinuity

$x-1 = \frac{3x}{x-4}$
 $2-1 = \frac{3(2)}{2-4}$

$-1 \neq \frac{6}{2}$ Discontinuity at $x=2$

$\frac{2}{x-2} = \frac{x^2-1}{x+1}$
 $\frac{2}{-1-2} = \frac{(-1)^2-1}{-1+1}$ $\frac{(x-1)(x+1)}{x+1}$

$\frac{2}{-3} = \frac{0}{0}$

~~use~~ use $x-1$ instead

$\frac{2}{-3} = -1-1$

$\frac{2}{-3} \neq -2$

Discontinuity at $x=-1$

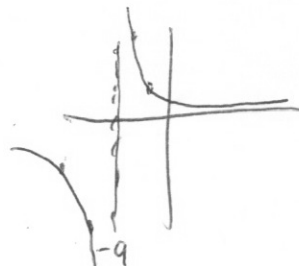
$f(x) = \frac{x^2-9}{x+9}$ a) $\lim_{x \rightarrow -9} f(x)$ b) $\lim_{x \rightarrow -9^-} f(x)$ c) $\lim_{x \rightarrow -9^+} f(x)$

$f(x) = \frac{(x-3)(x+3)}{x+9}$ $x+9=0$
 $x=-9$

$f(-9) = \frac{(-9)^2-9}{-9+9} = \frac{81-9}{0} = \frac{-72}{0}$ $x=-9$ is a Vert. Asymptote

-11	-10	-9	-8	-7
$\frac{121-9}{-2} = \frac{112}{-2}$	$\frac{91}{-1}$		$\frac{64-9}{1}$	$\frac{49}{2} = 20$
-56			55	

a) PNE b) $-\infty$ c) ∞



$$\lim_{x \rightarrow 24} \frac{\sqrt{x+1} - 5}{x-24}$$

$$\lim_{x \rightarrow 24} \frac{(\sqrt{x+1} - 5)(\sqrt{x+1} + 5)}{x-24(\sqrt{x+1} + 5)} = \lim_{x \rightarrow 24} \frac{(x+1) - 25}{x-24(\sqrt{x+1} + 5)} = \lim_{x \rightarrow 24} \frac{1}{\sqrt{x+1} + 5}$$

$$\frac{1}{5+5} = \left(\frac{1}{10}\right)$$

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

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

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

4) $\lim_{x \rightarrow 0} f(x) =$

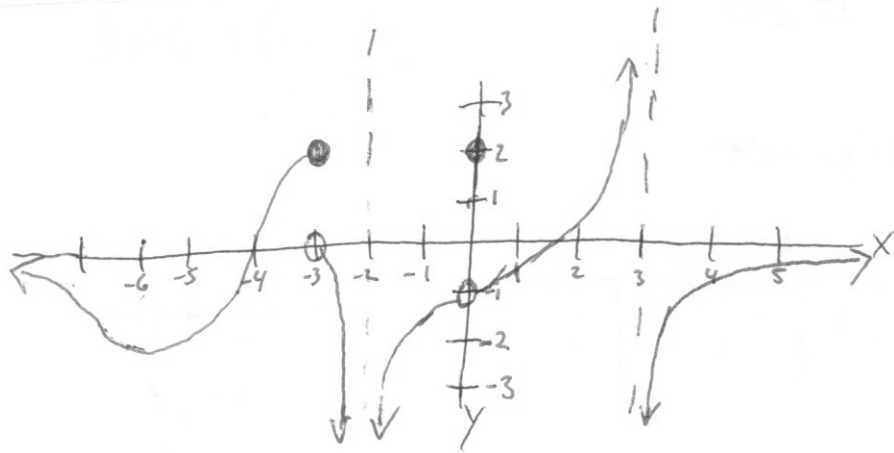
5) $\lim_{x \rightarrow 3} f(x) =$

6) $\lim_{x \rightarrow 3^-} f(x) =$

7) $f(-3) =$

8) $f(0) =$

9) $f(3) =$



① DNE ② 0 ③ $-\infty$ ④ -1 ⑤ DNE

⑥ $+\infty$ ⑦ 2 ⑧ 2 ⑨ DNE