

Team Name KEY

1 2 3 4 5

$$g(x) = \frac{5x^2 + 3x}{x^2 - 9} = \frac{x(5x+3)}{(x-3)(x+3)}$$

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

a) $\lim_{x \rightarrow \infty} g(x) = 5$

e) $\lim_{x \rightarrow -\infty} f(x) = 0$

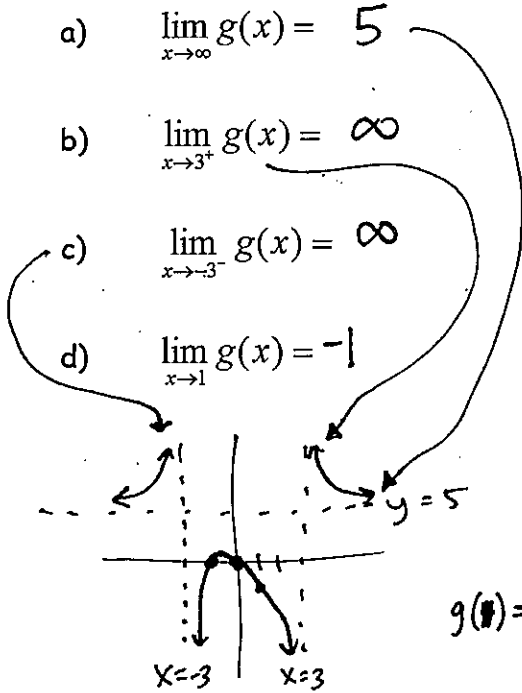
b) $\lim_{x \rightarrow 3^+} g(x) = \infty$

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

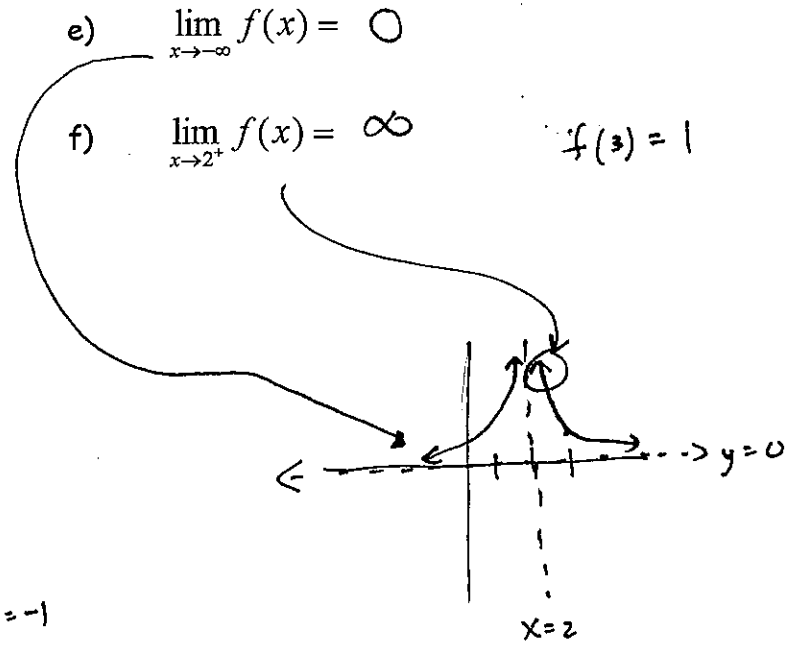
$f(3) = 1$

c) $\lim_{x \rightarrow 3^-} g(x) = \infty$

d) $\lim_{x \rightarrow 1} g(x) = -1$



$g(1) = \frac{8}{-8} = -1$



Team Name KEY

1 2 3 4 5

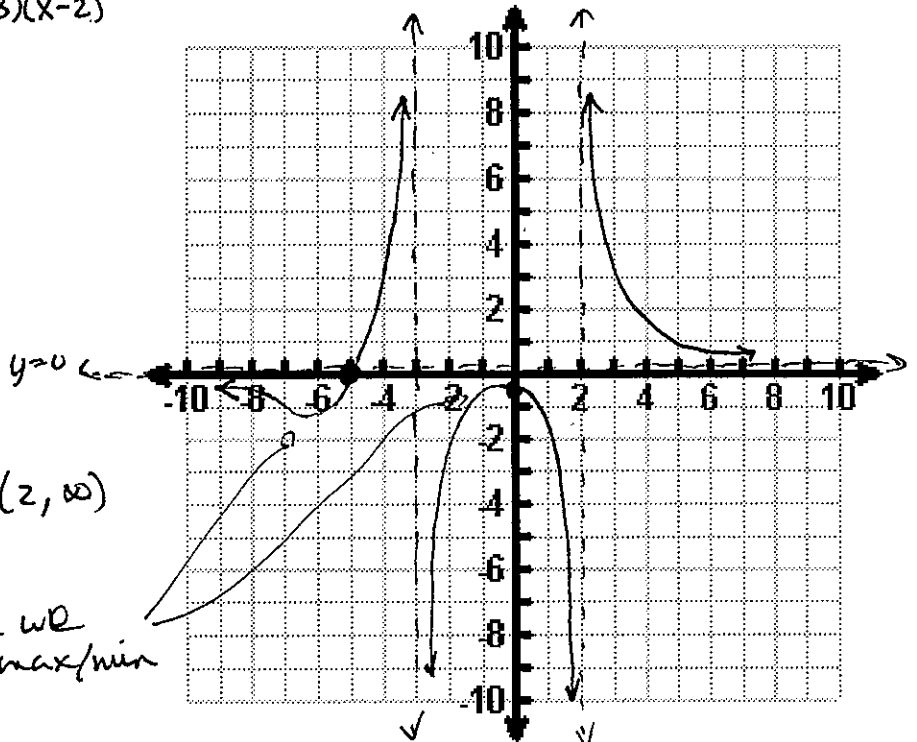
Graph $f(x) = \frac{x+5}{x^2+x-6} = \frac{x+5}{(x+3)(x-2)}$

EBA $y=0$

VA $x=-3$ $x=2$

x-int $(-5, 0)$

y-int $(0, -\frac{5}{6})$



Domain: $(-\infty, -3) \cup (-3, 2) \cup (2, \infty)$

Range: unknown since we don't know local max/min

Team Name KEY

1 2 3 4 5

Graph the following rational function.

$$f(x) = \frac{x^3 - 8}{x + 1} = \frac{(x-2)(x^2 + 2x + 4)}{x + 1}$$

$$\begin{array}{r} -1 \overline{) 1 \ 0 \ 0 \ -8} \\ \underline{ -1 \ 1 \ -1} \\ 1 \ -1 \ 1 \ -9 \end{array}$$

EBA $y = x^2 - x + 1$ $\xrightarrow{\text{vertex}}$

VA $x = -1$

x-int $(2, 0)$

y-int $(0, -8)$

Domain:

$$(-\infty, -1) \cup (-1, \infty)$$

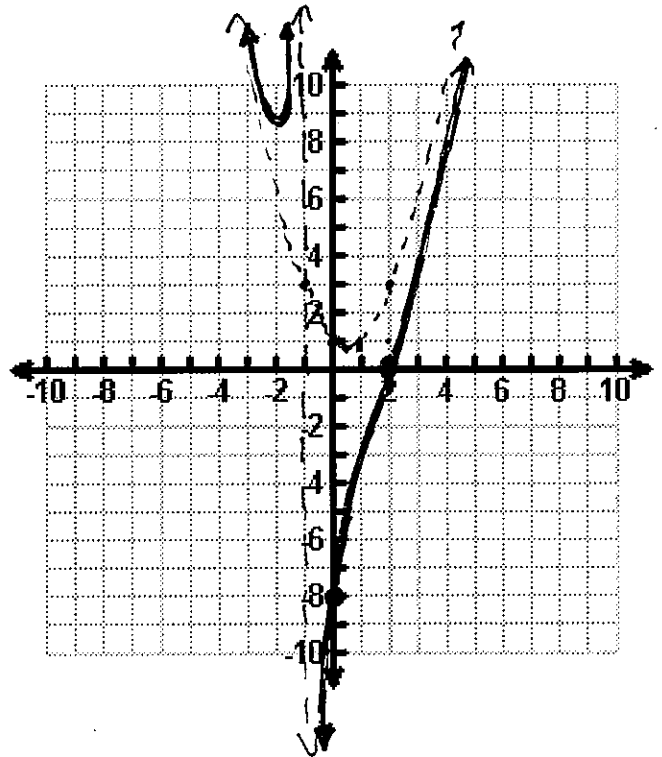
Range:

$$(-\infty, \infty)$$

$$x = \frac{1}{2} \left(\frac{1}{2}\right)^2$$

$$\left(\frac{1}{2}, \frac{3}{4}\right)$$

x	y
2	3
1	2



Team Name KEY

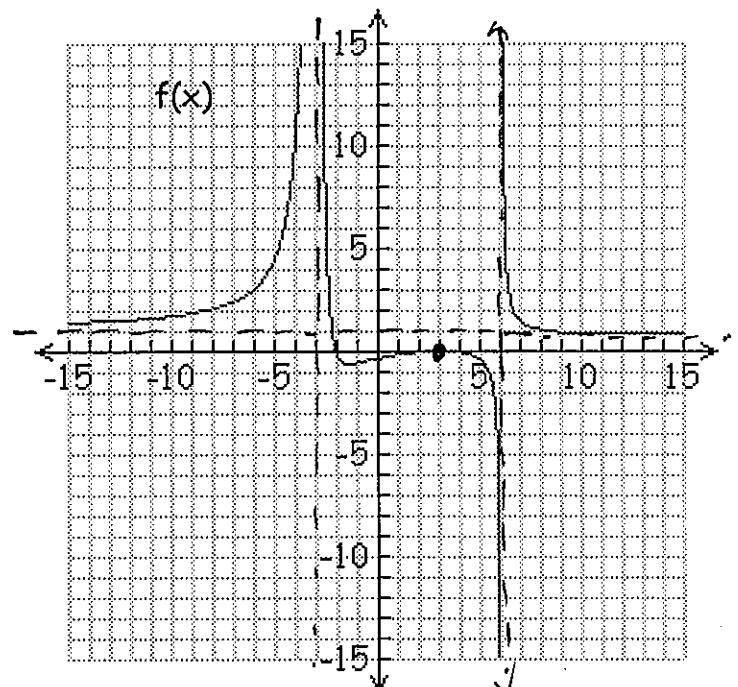
1 2 3 4 5

Write an equation for the rational function $f(x)$.

$$f(x) = \frac{(x-3)^2(x+2)}{(x+3)^2(x-6)}$$

notice the "bounce"

notice that both sides approach ∞



Team Name KEY

1 2 3 4 5

It is given that a varies jointly with p and inversely with the cube root of m . It is also given that when $p = 1/3$ and $m = 27$, then $a = 1/3$.

a) Write a function describing the relationship between a , p and m .

$$a = \frac{kp}{\sqrt[3]{m}} \quad \frac{1}{3} = \frac{k(\frac{1}{3})}{\sqrt[3]{27}} = \frac{k}{3(3)} = \frac{k}{9}$$
$$\frac{1}{3} = \frac{k}{9} \quad k = 3$$

$$a = \frac{3p}{\sqrt[3]{m}}$$

b) What is the value of a when $m = 1000$ and $p = 10/7$?

$$a = \frac{3(\frac{10}{7})}{\sqrt[3]{1000}} = \frac{3(\cancel{10})}{7(\cancel{10})} = \boxed{\frac{3}{7}}$$

Picture Round