

What have you learned?

NON-CALCULATOR

$$f(x) = \frac{x^3 - 2x^2 - 15x}{2x^3 + 5x^2 - 3x} = \frac{x(x^2 - 2x - 15)}{x(2x^2 + 5x - 3)} = \frac{x(x-5)(x+3)}{x(2x-1)(x+3)}$$

1) Find the equations of all asymptotes (horizontal and vertical).

$$x = \frac{1}{2} \quad \& \quad y = \frac{1}{2}$$

Note: there are holes
NOT asymptotes at
 $x = 0$ & $x = -3$

2) Find the x-values of all removable discontinuities.

$$x = 0 \quad \& \quad x = -3$$

3) Find $\lim_{x \rightarrow \infty} f(x)$ and $\lim_{x \rightarrow -\infty} f(x)$

$$\frac{1}{2} \qquad \frac{1}{2}$$

4) Find $\lim_{x \rightarrow -3} f(x)$

$$= \lim_{x \rightarrow -3} \frac{x-5}{2x-1} = \frac{-8}{-7} = \frac{8}{7}$$

5) Find $\lim_{x \rightarrow 2} f(x)$

$$= \lim_{x \rightarrow 2} \frac{x-5}{2x-1} = \frac{2-5}{4-1} = \frac{-3}{3} = -1$$

6) Find $\lim_{x \rightarrow \frac{1}{2}^+} f(x)$

$$= \lim_{x \rightarrow \frac{1}{2}^+} \frac{x-5}{2x-1} = \lim_{x \rightarrow \frac{1}{2}^+} (x-5) \cdot \lim_{x \rightarrow \frac{1}{2}^+} \frac{1}{2x-1} = \left[-\infty \right]$$

$-\frac{9}{2} \cdot +\infty$

7) Find $\lim_{x \rightarrow 0} f(x)$

$$= \lim_{x \rightarrow 0} \frac{x-5}{2x-1} = \frac{-5}{-1} = 5$$