

$$x^2 - x - 2 = 0$$

$$x = 2, -1 \quad (x-2)(x+1)$$

- Analyze:
- Domain
 - Range
 - Continuity
 - Increasing
 - Decreasing
 - Symmetry
 - Local Extrema
 - Concavity
 - Horizontal Asy
 - End Behavior Asy
 - Vertical Asymptote
 - Intercepts

Find the intercepts, analyze, and graph the given rational function.

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

Domain $(-\infty, -1) \cup (-1, 2) \cup (2, \infty)$

Range: $(-\infty, \text{Local max}] \cup (0, \infty)$

Discontinuous @ $x = -1, 2$

Inc: $(-\infty, -1) \quad (-1, \text{Local max})$

Dec: $(\text{Local max}, 2) \quad (2, \infty)$

Sym: None

Extrema: Local max $(2, \infty)$

Concavity: Concave up $(-\infty, -1)$
Concave Down $(-1, 2)$

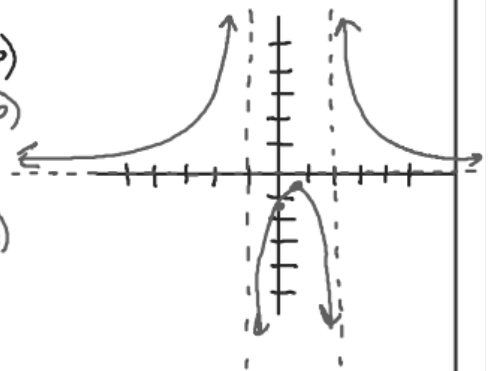
H.A. $y = 0$

E.B.A. None

V.A. $x = -1, 2$

x-intercept None

y-intercept $(0, -\frac{3}{2})$



$$\frac{3}{x^2 - x - 2}$$

$$\lim_{x \rightarrow -1^-} = \infty$$

$$\lim_{x \rightarrow -1^+} = -\infty$$

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

$$f(0) = \frac{3}{0^2 - 0 - 2}$$

$$\lim_{x \rightarrow 2^-} = -\infty$$

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

$$f(1) = \frac{3}{(1)^2 - 1 - 2}$$

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

$$x^2 - x - 2 = 0$$

$$x = -1, 2$$

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$$b) f(x) = \frac{x^2 - 3x - 10}{x^2 - x - 2}$$

$$\text{Domain } (-\infty, -1) \cup (-1, 2) \cup (2, \infty)$$

$$\text{Range } (-\infty, 1) \cup [\text{Local min}, \infty)$$

$$\text{Discontinuous @ } x = -1, 2$$

$$\text{Inc } (\text{Local min}, 2) \quad (2, \infty)$$

$$\text{Dec } (-\infty, -1) \quad (-1, \text{Local min})$$

$$\text{Sym None}$$

$$\text{Extrema Local min}$$

$$\text{Concavity Down } (-\infty, -1) \quad (2, \infty)$$

$$\text{Concavity up } (-1, 2)$$

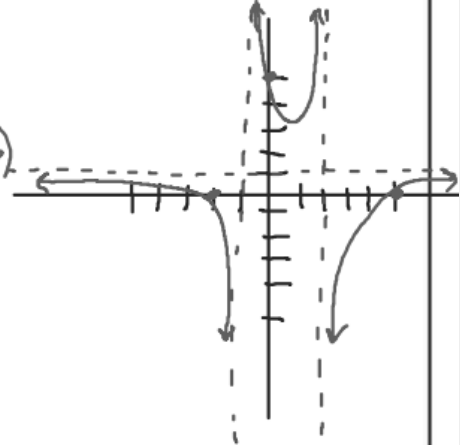
$$\text{H.A. } y = 1$$

$$\text{E.B.A None}$$

$$\text{V.A. } x = -1, 2$$

$$\text{x-intercepts } x = -2, 5$$

$$\text{y-intercept } (0, 5)$$



$$\frac{x^2 - 3x - 10}{x^2 - x - 2}$$

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

$$f(-1.1) = \frac{(-1.1)^2 - 3(-1.1) - 10}{(-1.1)^2 + 1.1 - 2}$$

$$\frac{1.21 + 3.3 - 10}{1.21 + 1.1 - 2}$$

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

$$\lim_{x \rightarrow -1^+} f(x) = \infty$$

$$f(-.9) = \frac{(-.9)^2 - 3(-.9) - 10}{(-.9)^2 + .9 - 2}$$

$$\frac{.81 + 2.7 - 10}{.81 + .9 - 2}$$

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

$$f(1.9) = \frac{(1.9)^2 - 3(1.9) - 10}{(1.9)^2 - 1.9 - 2}$$

$$\frac{3.61 - 5.7 - 10}{3.61 - 1.9 - 2}$$

$$f(2.1) = \frac{(2.1)^2 - 3(2.1) - 10}{(2.1)^2 - 2.1 - 2}$$

$$\frac{4.41 - 6.3 - 10}{4.41 - 2.1 - 2}$$

$$y = x - 2$$

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c) $f(x) = \frac{x^2 - 3x - 10}{x - 1}$

