

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

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

$$f(-1.1) = \frac{-}{+} \quad f(2.1) = \frac{-}{+}$$

- 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.

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

VA:  $x^2 - x - 2 = 0$   
 $(x-2)(x+1) = 0$   
 $x = 2 \quad x = -1$

$\lim_{x \rightarrow -1^-} f(x) = -\infty$      $\lim_{x \rightarrow -1^+} f(x) = \infty$   
 $\lim_{x \rightarrow 2^-} f(x) = \infty$      $\lim_{x \rightarrow 2^+} f(x) = -\infty$

HA:  $y = 1$   
 $\lim_{x \rightarrow \pm\infty} f(x) = 1$

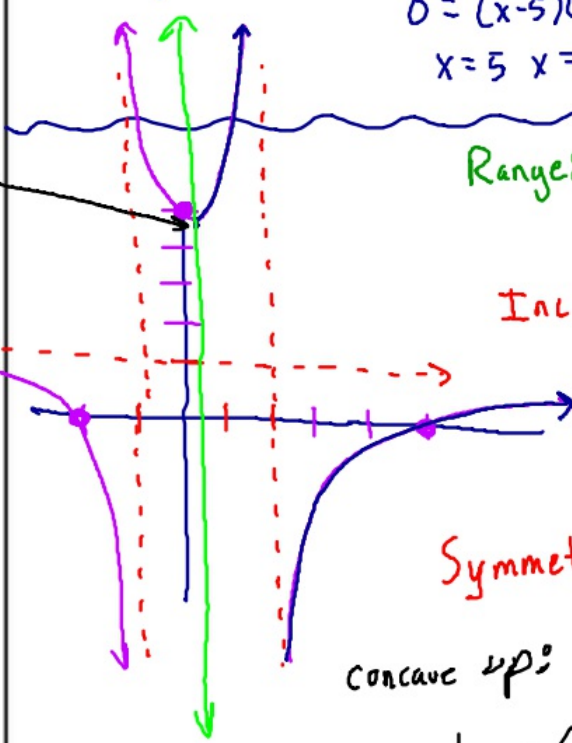
D:  $(-\infty, -1) \cup (-1, 2) \cup (2, \infty)$   
 Continuity:  $(-\infty, -1) \cup (-1, 2) \cup (2, \infty)$

Intercepts: x-int:  $0 = x^2 - 3x - 10$   
 $0 = (x-5)(x+2)$   
 $x = 5 \quad x = -2$

y-int:  $y = 5$

Local Minimum

Local Extrema  
 min or max



Range:  $(-\infty, 1) \cup (y\text{-coord of vertex}, \infty)$

Inc:  $(x\text{-coord of vertex}, 2) \cup (2, \infty)$

Dec:  $(-\infty, -1) \cup (-1, x\text{-coord of vertex})$

Symmetry: None

concave up:  $(-1, 2)$

down:  $(-\infty, -1) \cup (2, \infty)$

Analyze:

- Domain
- Range
- Continuity
- Increasing
- Decreasing
- Symmetry
- Local Extrema
- Concavity
- Horizontal Asy → NO
- End Behavior Asy → SLANT :  $y = x - 2$
- Vertical Asymptote
- Intercepts

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

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

$$\begin{array}{r} 1 \quad 1 \quad -3 \quad -10 \\ \phantom{1} \quad \phantom{1} \quad \phantom{-3} \quad \phantom{-10} \\ \hline 1 \quad -2 \quad \phantom{-10} \quad -12 \end{array}$$

