

Warm-Up

Determine the Domain, Vertical Asymptotes, Holes, Horizontal Asymptotes, and Slant Asymptotes

$$f(x) = \frac{x^2 - 3x + 2}{-4x^2 + 24x - 32}$$

Domain: $(-\infty, 2) \cup (2, 4) \cup (4, \infty)$

V.A. at $x=4$

Hole at $(2, \frac{1}{8})$

H.A. at $y = -\frac{1}{4}$

S.A. None

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

$$\frac{(x-1)}{-4(x-4)}$$
 Simp. $\frac{1}{8}$

Learning Targets

I can:

1. Find all X-Intercepts of a Rational Function
2. Find all Y-Intercepts of a Rational Function

X-Intercepts

- Set Simplified Numerator Equal to Zero and Solve

Y-Intercept

- Plug in Zero for all X Values of simplified expression

Examples

$$1. f(x) = \frac{x^2 - x - 12}{-4x + 12}$$

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

X-Int : $(4, 0)$ $(-3, 0)$

Y-Int : $(0, -1)$

$$\begin{array}{r} -12 \\ +12 \\ \hline = -1 \end{array}$$

$$2. f(x) = \frac{2x^2 - 18}{x^2 + 4x + 3}$$

$$\frac{2(x^2 - 9)}{(x+1)(x+3)} \Rightarrow$$

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

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

Simplified

X-Int : $(3, 0)$

Y-Int : $(0, -6)$

$$3. \quad f(x) = \frac{x^3 - 9x}{-3x^2 - 3x + 6} = \frac{x(x+3)(x-3)}{-3(x^2+x-2)}$$

$$\begin{aligned} X\text{-Int: } & (0,0), (-3,0), (3,0) \\ Y\text{-Int: } & (0,0) \end{aligned}$$

$$4. \quad f(x) = -\frac{1}{x+2} \quad | \neq 0$$

X-Int: None

Y-Int: $(0, -\frac{1}{2})$

Find Domain, All Asymptotes, Holes, X-intercepts, and Y-Intercept

$$f(x) = \frac{x^2 - 9}{x^2 + 7x + 12}$$

Domain:

$$(-\infty, -4) \cup (-4, -3) \cup (-3, \infty)$$

V.A. at $x = -4$

Hole: $(-3, -6)$

H.A. at $y = 1$

S.A. None

X-Int: $(3, 0)$

Y-Int: $(0, -\frac{3}{4})$

$$\frac{(x+3)(x-3)}{(x+3)(x+4)}$$

$$\boxed{\frac{x-3}{x+4}}$$

Simplified

Find Domain, All Asymptotes, Holes,
X-intercepts, and Y-Intercept

$$f(x) = \frac{x^2 + x - 12}{-2x - 2}$$

