

2.6 Day 2 Homework

Name KEY

For 1-4, state the domain for the rational function. Then, find any vertical asymptotes, horizontal asymptotes, and removable discontinuities for the rational function as well as any intercepts. Describe the behavior around any vertical asymptotes (limits) and then sketch a graph of the function.

1. $f(x) = \frac{x+4}{x+3} \quad x \neq -3$

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

V.A.: $x = -3$

H.A.: $y = 1$

Remov. Disc.: None

x-int.: $x = -4$

y-int.: $y = 4/3$

Behavior around V.A.:

2.9 $\lim_{x \rightarrow -3^+} f(x) = \infty$

3.1 $\lim_{x \rightarrow -3^-} f(x) = -\infty$

2. $f(x) = \frac{1}{x^2 + 6x + 5} = \frac{1}{(x+5)(x+1)} \quad x \neq -1, -5$

Domain: $(-\infty, -5) \cup (-5, -1) \cup (-1, \infty)$

V.A.: $x = -1, x = -5$

H.A.: $y = 0$

Remov. Disc.: None

x-int.: None

y-int.: $y = 1/5$

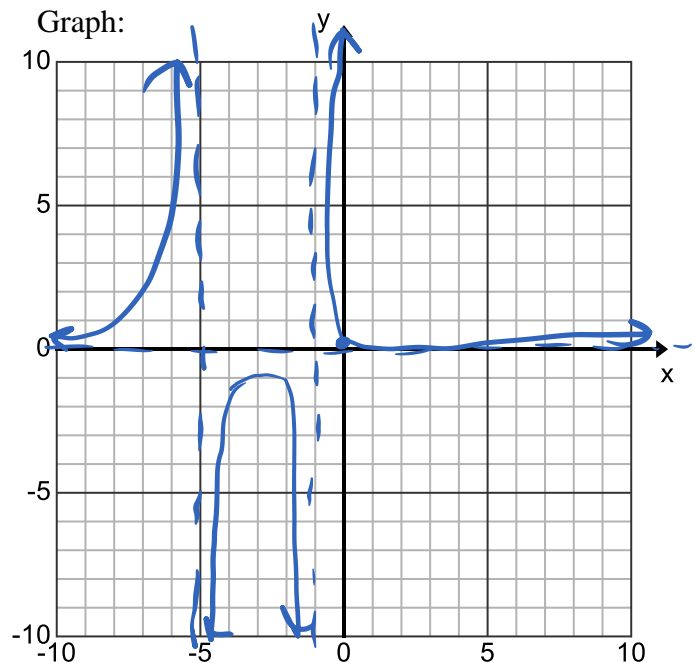
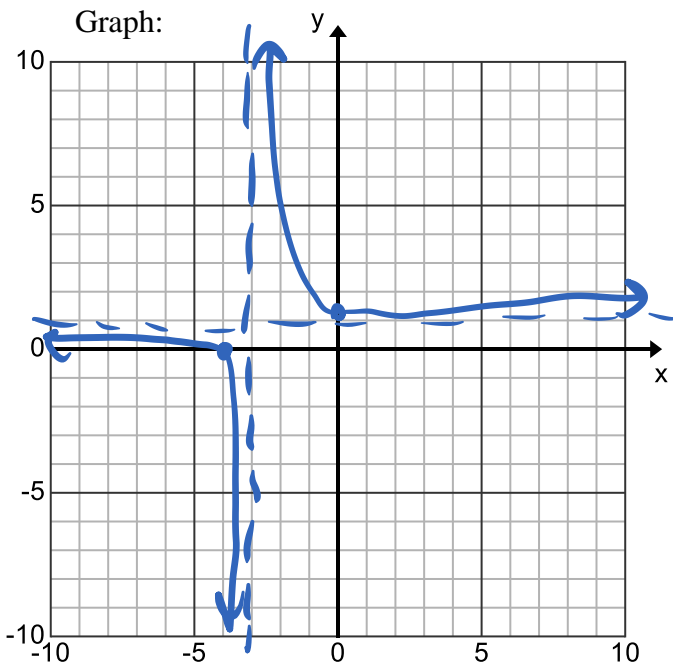
Behavior around V.A.:

-.9 $\lim_{x \rightarrow -1^+} f(x) = \infty$

-1.1 $\lim_{x \rightarrow -1^-} f(x) = -\infty$

-.9 $\lim_{x \rightarrow -5^+} f(x) = -\infty$

5.1 $\lim_{x \rightarrow -5^-} f(x) = \infty$



$$3. f(x) = \frac{x^2 + x - 6}{x^2 - x - 12} = \frac{(x+3)(x-2)}{(x+3)(x-4)}$$

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

V.A.: $x = 4$

H.A.: $y = 1$

Remov. Disc.: $(-3, 5/7)$ $y = \frac{-3-2}{-3-4} = \frac{5}{7}$

x-int.: $x = 2$

y-int.: $y = 1/2$

Behavior around V.A.:

4.1 $\lim_{x \rightarrow 4^+} f(x) = \infty$

3.9 $\lim_{x \rightarrow 4^-} f(x) = -\infty$

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

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

V.A.: $x = -1$

H.A.: $y = 3$

Remov. Disc.: $(1, 2)$ $y = \frac{4}{2} = 2$

x-int.: $x = -1/3$

y-int.: $y = 1$

Behavior around V.A.:

-1.9 $\lim_{x \rightarrow -1^+} f(x) = -\infty$

-1.1 $\lim_{x \rightarrow -1^-} f(x) = \infty$

