Name: _____

Asymptotes of Rational Functions

State the domain using interval notation. For any *x-value* excluded from the domain, state whether the graph has a vertical asymptote or a "hole" at that *x-value*. Use a graphing calculator to check your answer.

1.
$$f(x) = \frac{x+5}{x+1}$$
 2. $f(x) = \frac{x^2+2x-3}{x^2-4x+3}$

Find any holes, asymptotes, and intercepts and state the end behavior.

$$f(x) = \frac{x-1}{x^2 + x - 6}$$
7. $f(x) = \frac{x-1}{x+1}$

Sketch the graph of the given rational function. Also state the function's domain and range using interval notation. Find any x and y intercepts, state the end behavior, and behavior around the asymptotes.

8.
$$f(x) = \frac{x+1}{(x-1)^2(x+2)}$$

Domain:

Range:

X – intercept:

Y – intercept:

V Asymptote:

Hole:

increasing:

decreasing:

End Behavior:



↑ y

Asymptotes Behavior:

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

Domain: Range: X – intercept: Y – intercept: V Asymptote: Hole: increasing: decreasing: End Behavior:



Asymptotes Behavior:

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

Domain:

Range:

X – intercept:

Y – intercept:

V Asymptote:

Hole:

Increasing:

Decreasing:

End Behavior:



Asymptotes Behavior:

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

Domain: Range: X – intercept: Y – intercept: V Asymptote: Hole: increasing: decreasing: End Behavior:



Asymptotes Behavior:

18. Draw Conclusions For what value(s) of *a* does the graph of $f(x) = \frac{x+a}{x^2+4x+3}$

have a "hole"? Explain. Then, for each value of a, state the domain and the range of f(x) using interval notation.

19. Critique Reasoning A student claims that the functions $f(x) = \frac{4x^2 - 1}{4x + 2}$ and $g(x) = \frac{4x + 2}{4x^2 - 1}$ have different domains but identical ranges. Which part of the student's claim is correct, and which is false? Explain.

Review

Simplify the following rational expressions

1.
$$\frac{2}{x^2 - x - 2} \cdot \frac{10}{x^2 + 2x - 8}$$
 2. $\frac{x}{x^2 - 6x + 8} \cdot \frac{1}{x^2 - x - 12}$