

Ch 1 Continuity and Rational Functions

Name: _____

No Calculator!!!

1. For what value(s) of x is $f(x) = \frac{x}{x^2 - 1}$ discontinuous?

2. $f(x) = \frac{x}{x^2 + 2x}$ is continuous for all real numbers EXCEPT:

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

4. $f(x) = \frac{1}{x^2 + 1}$ is defined for all real numbers EXCEPT:

For #5 to #8, find the vertical asymptotes of each function.

5. $f(x) = \frac{x}{x^2 - 49}$

6. $f(x) = \frac{x}{4x + 8}$

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

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

For #9 to #12, find the horizontal asymptotes of each function.

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

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

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

12. $f(x) = \frac{x^3 - 1}{x - 1}$

Multiple Choice.

13. $f(x) = \frac{(x-1)^2}{x^2 - 1}$ has

14. For $f(x) = \frac{x^3 + 8}{(x+2)^2}$, choose all that are true.

- (A) a hole at $x = -1$
- (B) holes at $x = -1$ and $x = 1$
- (C) vertical asymptotes at $x = 1$ and $x = -1$
- (D) horizontal asymptote at $y = -1$
- (E) a hole at $x = 1$ and a vertical asymptote at $x = -1$

- (A) hole at $x = -2$
- (B) vertical asymptote at $x = -2$
- (C) horizontal asymptote at $y = 0$
- (D) horizontal asymptote at $y = 1$
- (E) no horizontal asymptote

Find each characteristic of the rational functions and then sketch their graphs.

15. $y = \frac{5x}{x-2}$

a) zeros

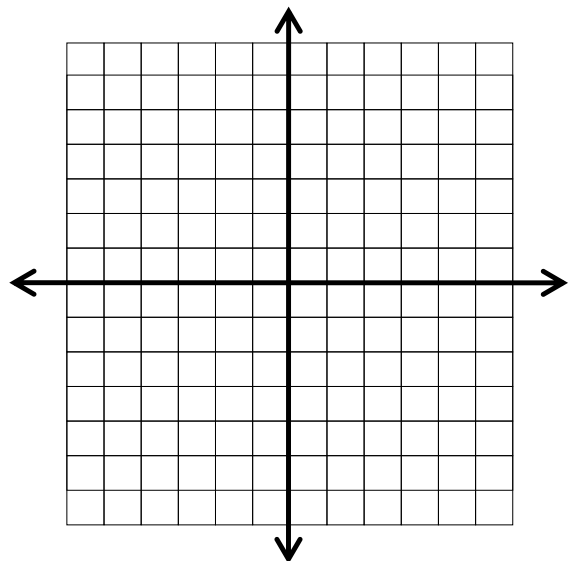
b) y-intercepts

c) undefined values of x

d) vertical asymptotes

e) horizontal or slant asymptotes

f) identify each discontinuity as essential or removable



16. $y = \frac{2x}{x^2 - 1}$

a) zeros

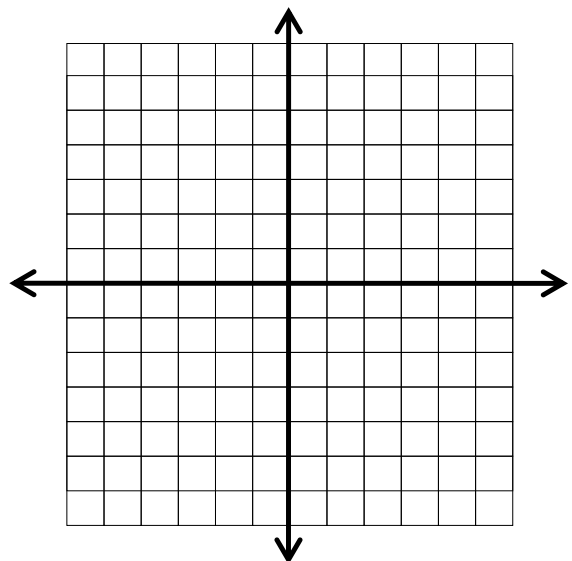
b) y-intercepts

c) undefined values of x

d) vertical asymptotes

e) horizontal or slant asymptotes

f) identify each discontinuity as essential or removable



17. $y = \frac{x^2}{x-3}$

a) zeros

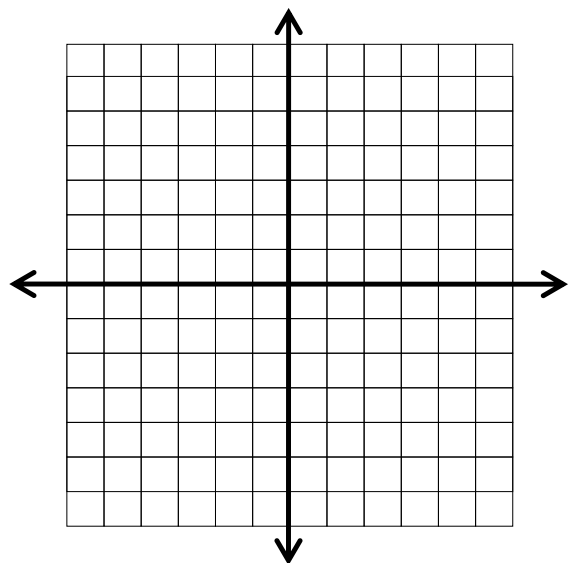
b) y-intercepts

c) undefined values of x

d) vertical asymptotes

e) horizontal or slant asymptotes

f) identify each discontinuity as essential or removable



18. $y = \frac{x^2 - 1}{x - 1}$

a) zeros

b) y-intercepts

c) undefined values of x

d) vertical asymptotes

e) horizontal or slant asymptotes

f) identify each discontinuity as essential or removable

