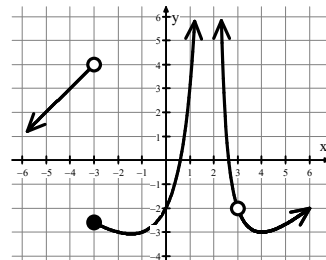Write your questions and
thoughts here!

3.1 Discontinuity & Domain
An Algebraic Approach

Name:_____

Recall:

- Types of discontinuities:
    1. _____ (removable)
    2. _____ (nonremovable)
    3. _____

- Domain refers to all the possible x-values of a function.

Discontinuities – (1) Find and (2) Classify each discontinuity.

1. $f(x) = \dfrac{x-5}{x+1}$	2. $f(x) = \dfrac{x+3}{(x+3)(\sqrt{x-2})}$	3. $f(x) = \dfrac{\sqrt{4-x}}{4}$
4. $f(x) = \dfrac{x+1}{x^3+5x^2+6x}$	5. $f(x) = \dfrac{2x+1}{2x^2-13x-7}$	6. $f(x) = \dfrac{3x}{3}$

Domain – where the function exists!

The denominator can't be zero.	7. $f(x) = \dfrac{x-5}{x+1}$	8. $w(t) = \dfrac{t+1}{t^3+5t^2+6t}$	9. $b(x) = \dfrac{1-x}{2}$
Even radicals can't be negative.	10. $g(x) = \sqrt{7x+3}$	11. $f(x) = \dfrac{x-7}{\sqrt{5-x}}$	12. $h(x) = \dfrac{\sqrt{2x-6}}{(x+5)(x-5)}$

Classify all discontinuities AND find the domain.

13. $a(t) = \dfrac{3t}{t\sqrt{t-5}}$

14. $h(a) = \dfrac{5}{2-\sqrt{a}}$

3.1 Practice – Discontinuity & Domain

Name: _____

Pre-Calculus

For 1 – 9, **find** and **classify** each discontinuity.

1. $f(x) = \dfrac{x}{x-3}$

2. $g(x) = \sqrt{9+4x}$

3. $h(x) = \dfrac{x-5}{x^2-4x-5}$

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

5. $w(x) = \dfrac{5x+15}{3}$

6. $f(x) = \dfrac{3x+4}{9x^2-16}$

7.
$$h(t) = \frac{3t^2 + t}{t^3 + 3t^2 - 28t}$$

8.
$$a(x) = \frac{6x^2 + 19x - 7}{10x^2 + 37x + 7}$$

9.
$$f(x) = \frac{2}{x^2 + 4}$$

For 10 – 21, identify the domain of each function. (use inequality notation)

10.
$$w(x) = \frac{\sqrt{2x - 5}}{3}$$

11.
$$s(t) = \frac{5}{\sqrt{4t - 8}}$$

12.
$$f(x) = \frac{x}{\sqrt{36 - 6x}}$$

13.
$$g(x) = \frac{x + 7}{x^2 - 2x - 15}$$

14.
$$v(t) = \frac{2t}{t\sqrt{t + 6}}$$

15.
$$g(w) = \frac{7}{5 - \sqrt{w}}$$

16.
$$s(t) = \sqrt[3]{3t - 9}$$

17.
$$g(x) = \frac{x}{|x| - 3}$$

18.
$$h(t) = \frac{\sqrt{1 - t}}{t - 3}$$

19.
$$a(t) = (t - 4)(\sqrt{t})$$

20.
$$g(x) = x^3 + 7x^2 + 12x$$

21.
$$h(t) = \frac{t^2 - t}{5t^3 - 7t^2 + 2t}$$

For 22 – 27, identify the domain of each function AND classify each discontinuity.

22. $w(x) = \dfrac{8x + 12}{4}$	23. $f(x) = \dfrac{8x - 5}{64x^2 - 25}$	24. $h(x) = \dfrac{x + 1}{x^2 - 5x - 6}$
25. $v(x) = \dfrac{3x}{x\sqrt{x + 9}}$	26. $g(x) = \dfrac{\sqrt{5 - x}}{x - 8}$	27. $f(x) = \dfrac{1}{x^2 + 1}$

Skillz Review: Solve or evaluate.

1. $\sqrt{-32}$	2. $x^2 = -75$	3. $(x - 3)^2 = 25$	4. $(x - 5)^2 = -17$

3.1 Application and Extension

Find the domain of each function.

a. $v(t) = \dfrac{\sqrt{t + 1}}{t - 2}$	b. $a(x) = \dfrac{x - 2}{2 + \sqrt{x}}$

1. Mr. Kelly wants to create a rectangular feeding pen for his pigs, but only has 50 meters of fencing. He decides to use the side of his house as one side of the pen.

    a. Draw a picture of this scenario and label the sides. Use x as the side of the pen that is perpendicular to his house.

    b. Write an equation for the area A of the pen in terms of x.

    c. What is the domain of the function A. (determined by the physical restrictions)?

2. Mr. Brust has finally reached his dream in life and is going to live on a deserted island as a hermit and grow out a goatee. The problem is he needs to get freshwater out to the island from the mainland. The island is 8 miles offshore. It costs $10,000 per mile to lay pipe on land and $15,000 per mile to lay the pipe in the lake (see picture below).

    a. Express the total cost C of constructing the pipeline as a function of x.

    b. What is the domain of the function C? (*Hint*: there are restrictions based on the possible values of x.)

Land

8 miles

Lake

Pipe

Freshwater source

x

20 – x

20 miles