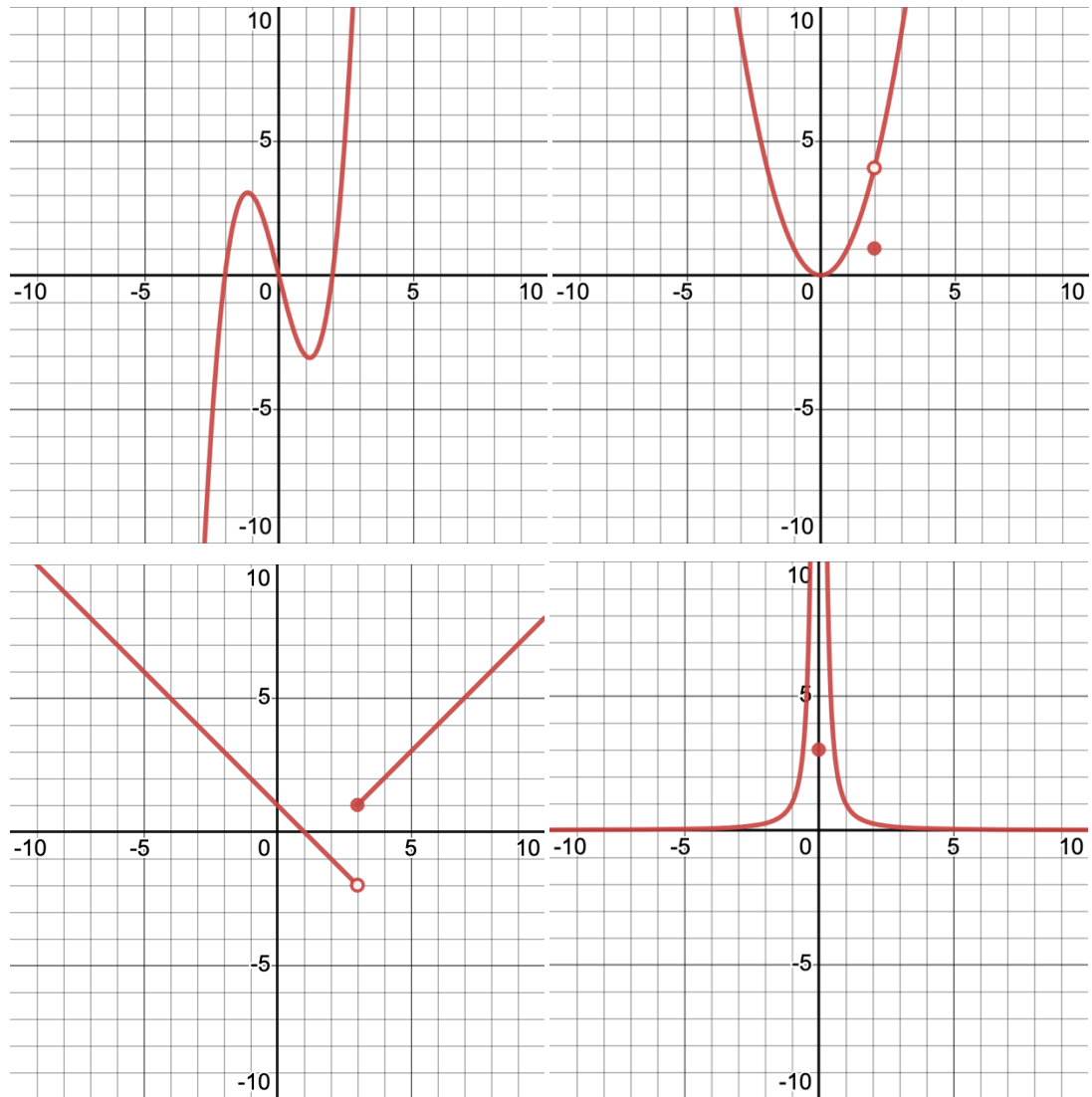


## Day 3 - Section 2.4

Notes:

What do these graphs have in common, what is unique about each one?



Let's make a definition:

Three kinds of discontinuities:

**Removable:**

**Infinite:**

**Jump:**

Draw a graph on the grid below of a function with domain  $(-5, 5]$ , a jump discontinuity at  $x = -2$ , and a removable discontinuity at  $x = 3$ .

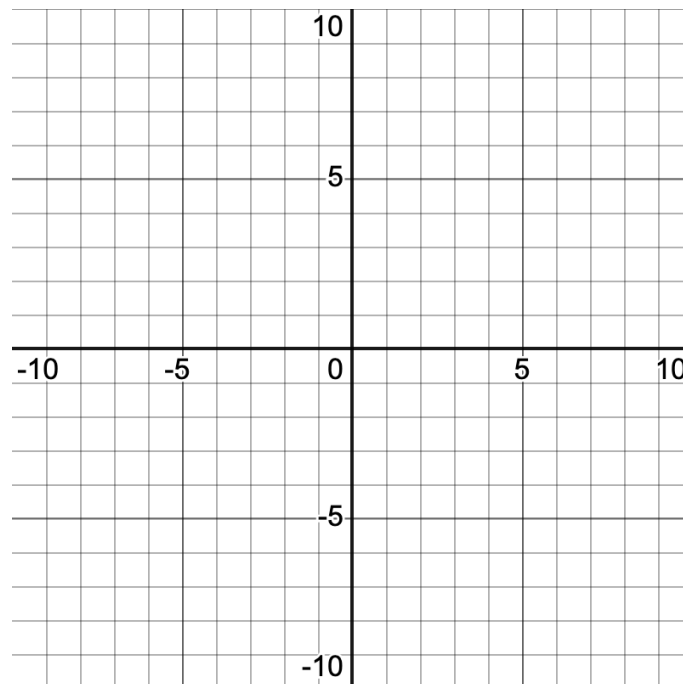


Figure 1: Chart Description automatically generated

**Definition of Continuity from the left and the right:**

**Types of functions that are continuous:**

## Continuity makes limits easier

## Intermediate Value Theorem

Sketch the graph of each function. Use the graph to determine if it is continuous everywhere, or sometimes discontinuous. If there is a discontinuity identify where it is, and describe it as removable, infinite, or jump.

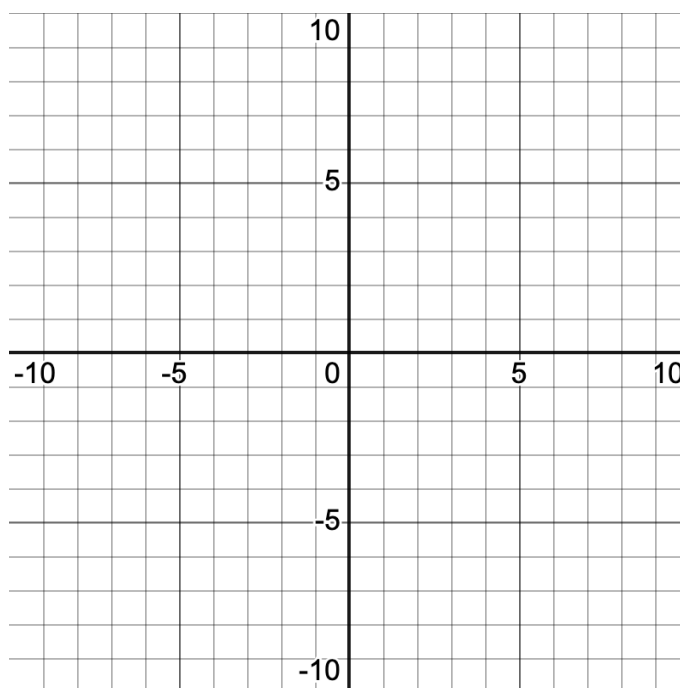
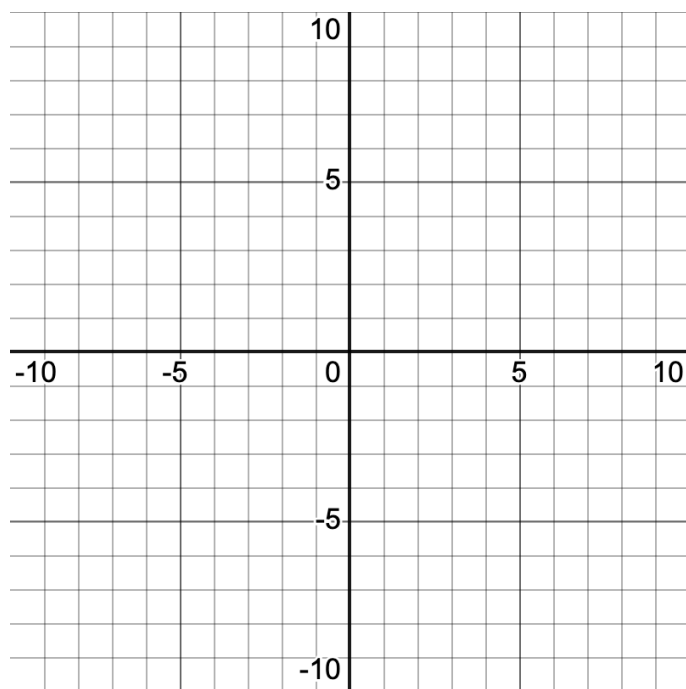
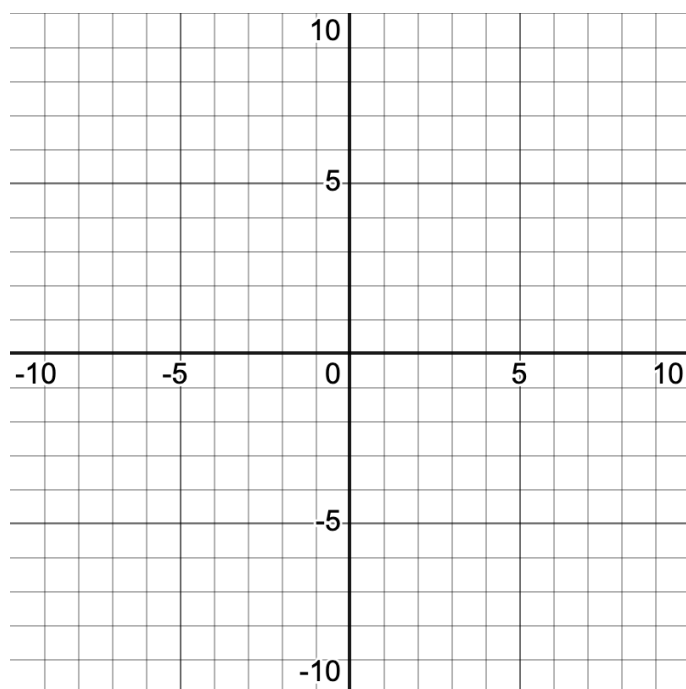


Figure 2: Chart Description automatically generated

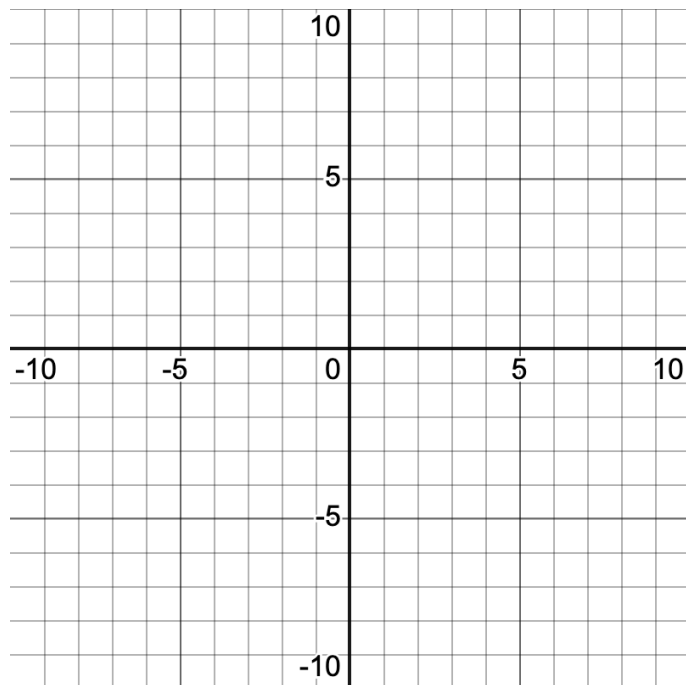
1.  $f(x) = \begin{cases} e^x & x < 0 \\ x^2 & x \geq 0 \end{cases}$



$$2. f(x) = \begin{cases} \sqrt[3]{x} & x \neq 2 \\ -3 & x = 2 \end{cases}$$

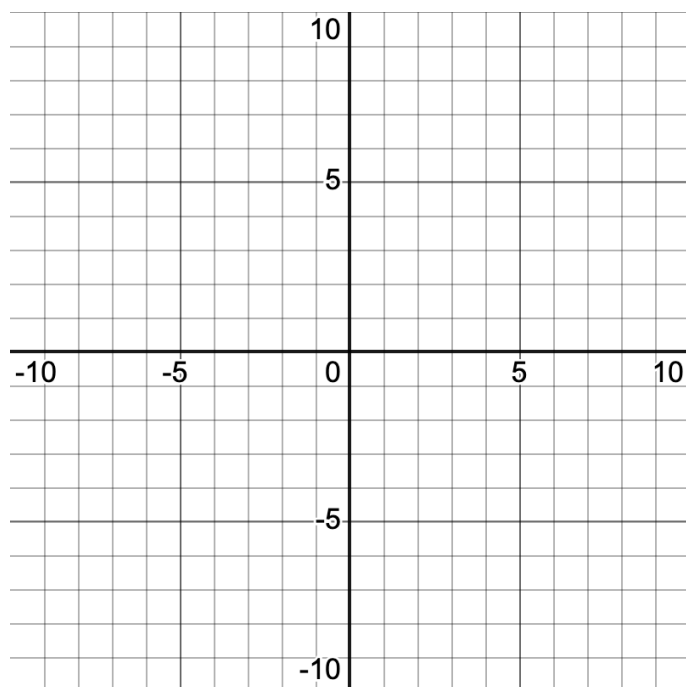


3.  $f(x) = \frac{1}{x-3}$



4.  $f(x) = (x - 3)(x + 1)(x + 4)$

5.  $f(x) = \begin{cases} \sin x & x < 0 \\ x^3 & x \geq 0 \end{cases}$



6. What value of  $a$  makes the function  $g(x) = \begin{cases} 3x - 1 & x < 2 \\ x + a & x \geq 2 \end{cases}$  continuous everywhere?
7. Use the intermediate value theorem to show that  $f(x) = x^3 - 3x^2 + 4$  has a zero.