CONTINUITY:

A FUNCTION IS CONTINUOUS AT $x=a$ IF $\lim_{x \to a} f(x) = f(a)$. A FUNCTION IS CONTINUOUS FROM THE RIGHT IF $\lim_{x \to a^+} f(x) = f(a)$. A FUNCTION IS CONTINUOUS FROM THE LEFT IF $\lim_{x \to a^-} f(x) = f(a)$. A FUNCTION IS CONTINUOUS ON $[a,b]$ IF IT IS CONTINUOUS AT $x=a$, $x=b$, AND EVERY POINT IN BETWEEN a AND b.

NOTE: POLYNOMIAL, LOG, EXPONENTIAL, RADICAL, AND RATIONAL FUNCTIONS ARE CONTINUOUS ON THEIR DOMAIN.

NOTE: FOR PIECEWISE FUNCTIONS, FOCUS ON THE "CHANGE POINT"

DISCONTINUITY:

REMOVABLE DISCONTINUITY:

* HOLES
* THE LIMIT EXISTS AT A POINT, BUT THE FUNCTION IS NOT DEFINED AT THAT POINT
* HOW TO "REDEFINE" A FUNCTION TO BE CONTINUOUS AT A POINT, a:

1. SIMPLIFY THE FUNCTION
2. FIND $f(a)$ USING THE SIMPLIFIED FUNCTION

JUMP DISCONTINUITY:

* USUALLY PIECEWISE OR ABSOLUTE VALUE FUNCTIONS
* OCCUR WHEN LEFT HAND LIMITS AND RIGHT HAND LIMITS ARE NOT EQUAL

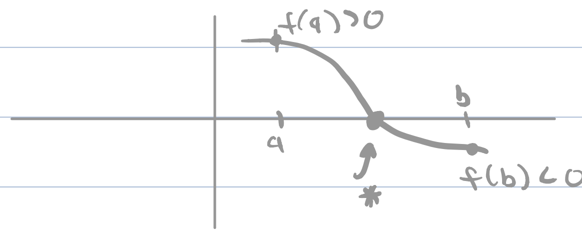
INFINITE DISCONTINUITY:

* YOU MUST SIMPLIFY FIRST*
* OCCURS WHEN AT LEAST ONE SIDE OF THE LIMIT IS $\pm\infty$

*VERTICAL ASYMPTOTES

<u>INTERMEDIATE VALUE THEOREM:</u>

- IF $f(x)$ IS CONTINUOUS ON $[a,b]$ AND $f(a)>0$ AND $f(b)<0$ (OR IF $f(a)<0$ AND $f(b)>0$) THEN THERE IS A POINT x IN $[a,b]$ SUCH THAT $f(x)=0$.
- IF f IS CONTINUOUS ON $[a,b]$ AND $f(a)<y<f(b)$ THEN THERE IS A POINT x IN $[a,b]$ SUCH THAT $f(x)=y$.



TO CHECK IF THE "IVT" HOLDS ON $[a,b]$

1. CHECK IF f IS CONTINUOUS ON $[a,b]$
2. CHECK IF $f(a)$ AND $f(b)$ HAVE OPPOSITE SIGNS