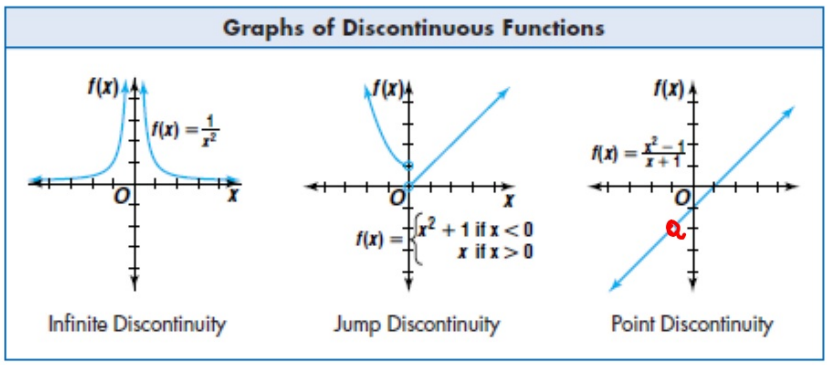
Trig 3.5

Determine whether a function is continuous
Identity end behavior of a function
Determine whether a function is increasing or decreasing on an interval

continuous
discontinous
end behavior *(algebra 2)*
increasing
decreasing
interval
infinite discontinuity
jump discontinuity
point discontinuity

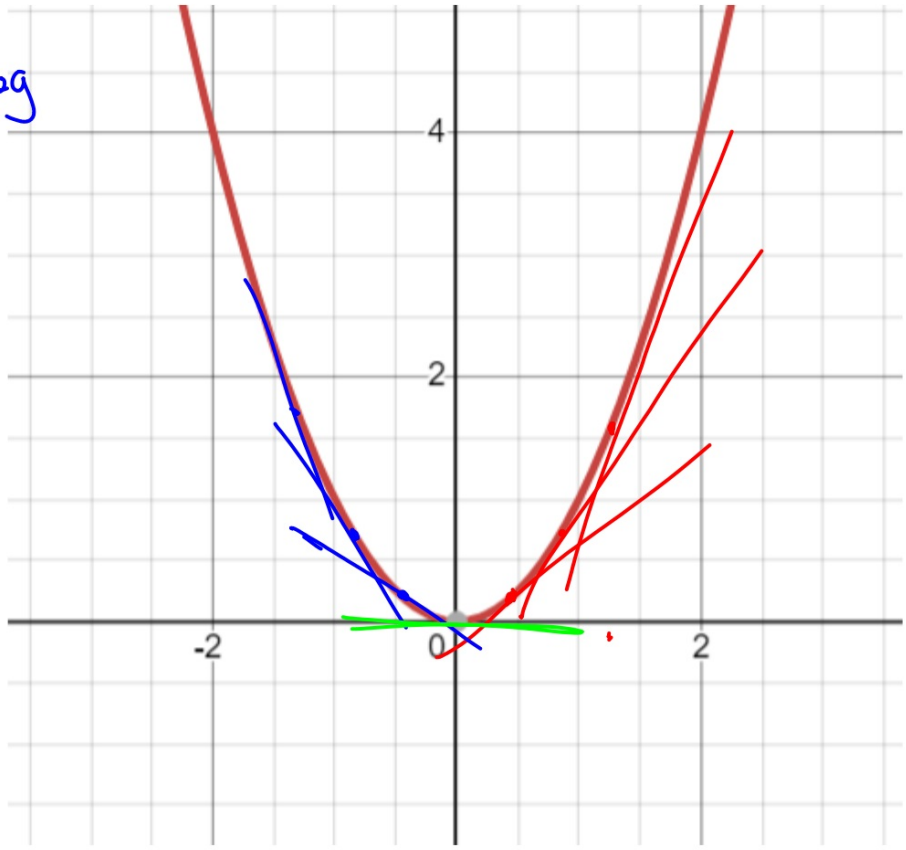
$x^2 - 1 \quad (x+1)(x-1) \quad x+1=0 \quad x=-1$



graphing calculators--table

Related to slope...
Increasing function pos.
Decreasing function
(can be 0 at times) neg

Slope is changing
because nonlinear



Start with x>0 etc.
Translate answers to "interval notation"

dec. always $(-\infty, \infty)$

Graph each function. Determine the interval(s) for which the function is increasing and the interval(s) for which the function is decreasing.

26. $y = x^3 + 3x^2 - 9x$

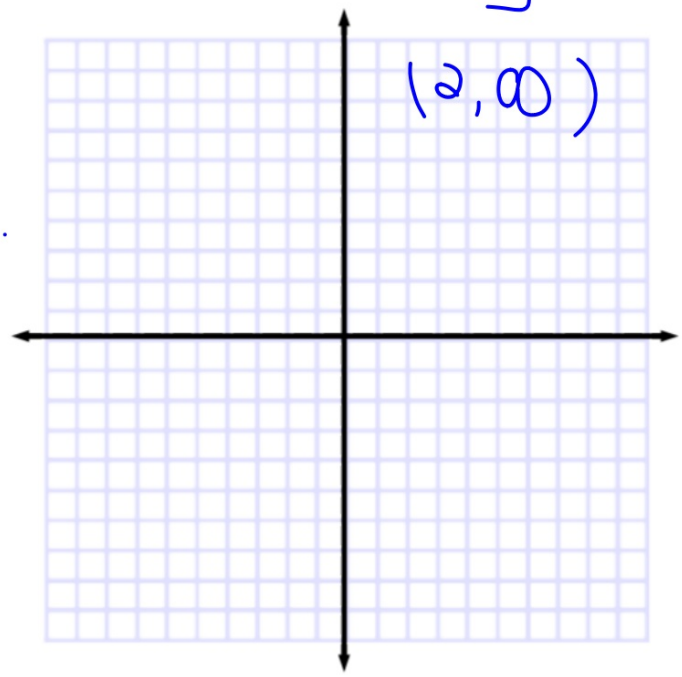
27. $y = -x^3 - 2x + 1$

Interval notation open/closed

$(-\infty, -3)$ incr. $x < -3$

$[-3, 2]$ → decr. $-3 \leq x \leq 2$

incr. $x > 2$



$(2, \infty)$

Graphing calc?

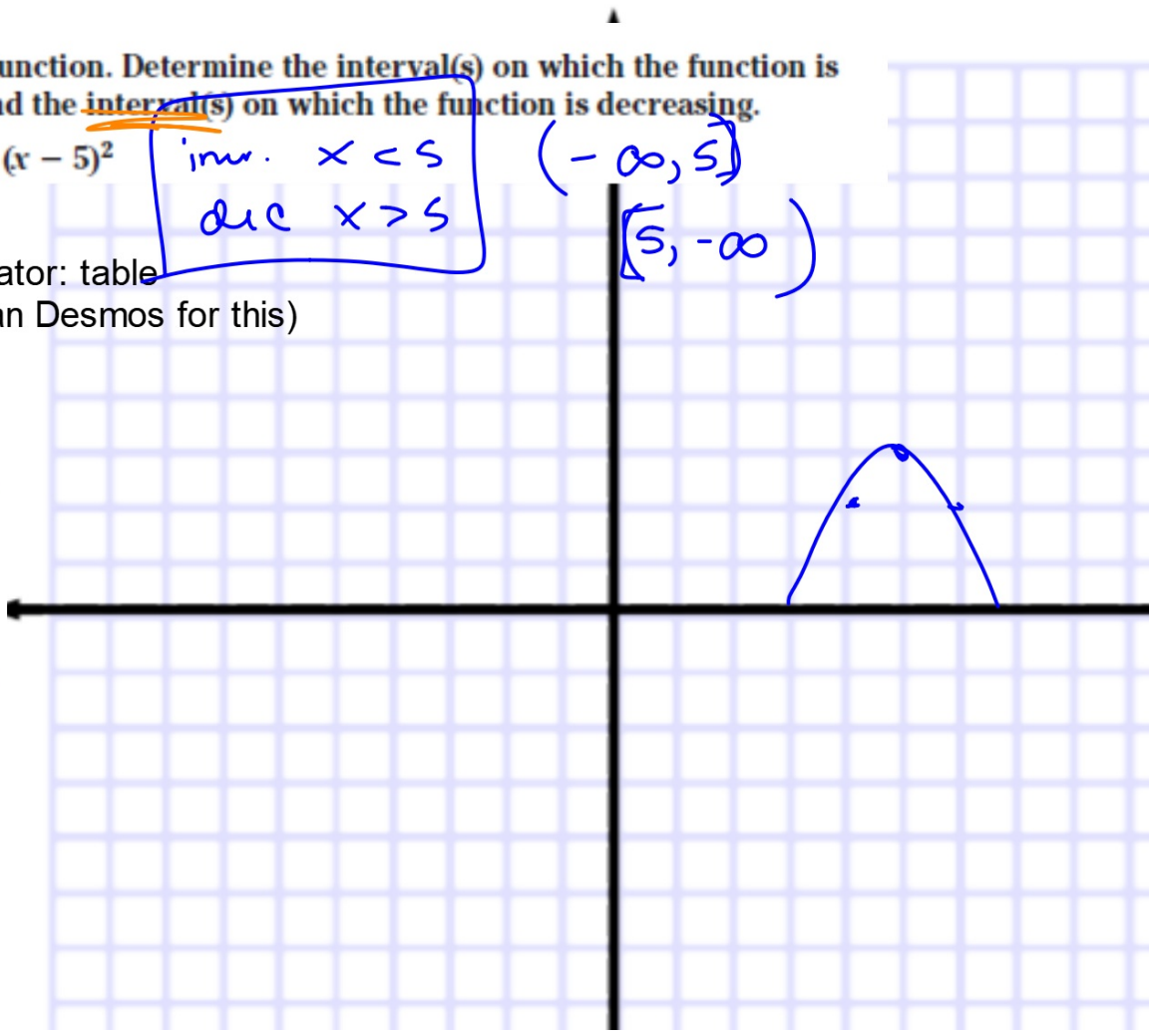
4 **Graph each function. Determine the interval(s) on which the function is increasing and the interval(s) on which the function is decreasing.**

a. $f(x) = 3 - (x - 5)^2$

inc. $x < 5$ $(-\infty, 5]$

dec $x > 5$ $[5, -\infty)$

Graphing calculator: table
(gc is easier than Desmos for this)



Graphing Calculator Tip

By watching the x- and y-values while using the **TRACE** function, you can determine approximately where a function changes from increasing to decreasing and vice versa.

14. $f(x) = \frac{x+3}{(x-3)^2}; x = -3$ *Continuous?*

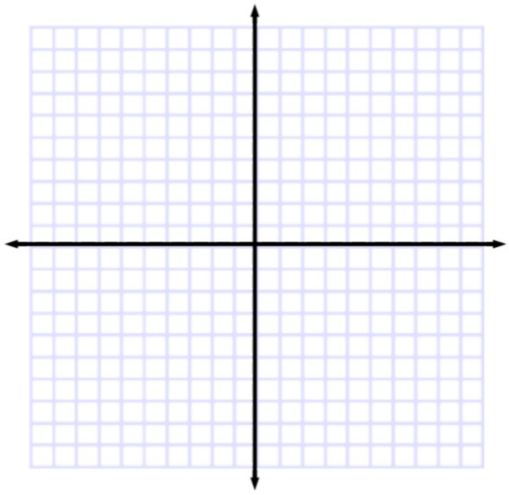
$$\frac{-3+3}{(-3-3)^2} = \frac{0}{36} = 0$$

16. $f(x) = \begin{cases} 3x + 5 \text{ if } x \leq -4 \\ -x + 2 \text{ if } x > -4 \end{cases}; x = -4$

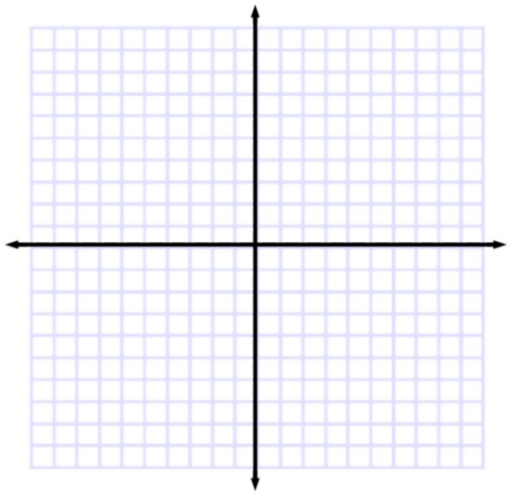
Continuous?

Describe the end behavior

20. $y = x^3 + 2x^2 + x - 1$



22. $f(x) = x^{10} - x^9 + 5x^8$



28. $f(x) = \frac{1}{x+1} - 4$