Function Analysis
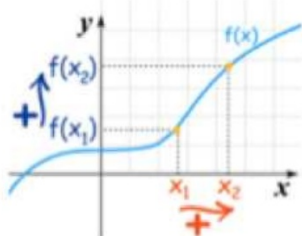
There's a fine line between a numerator and a denominator.*

*Only a fraction of you will understand this.

*See printout.

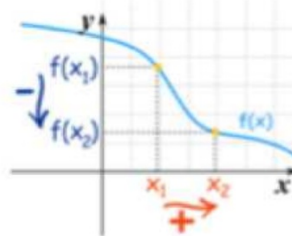# Increasing and Decreasing

| A function is "increasing" when the y-values increase as the x-values increase:	A function is "decreasing" when the y-values decrease as the x-values increase:
(More simply, as you look at the graph from left to right, the graph goes <u>up</u>.)	(More simply, as you look at the graph from left to right, the graph goes <u>down</u>.)

*When stating the intervals on which a function is increasing or decreasing do NOT include endpoints.

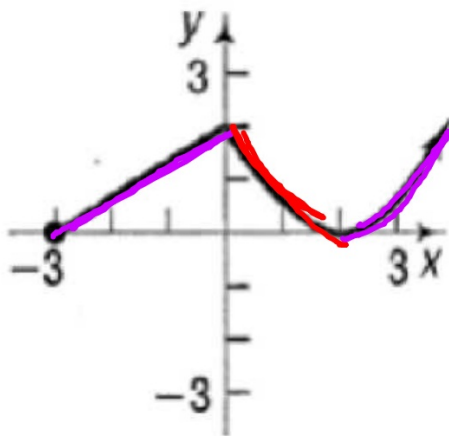Ex 1) Determine the intervals on which the graph is increasing and decreasing.
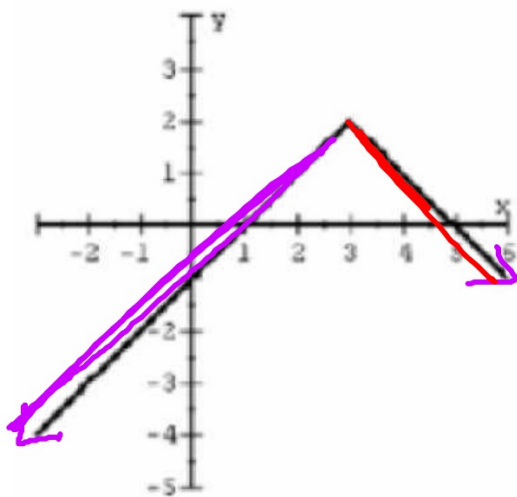
a)

incr : $(-\infty, 3)$ ← x-values

decr : $(3, \infty)$

Ex 1) Determine the intervals on which the graph is increasing and decreasing.
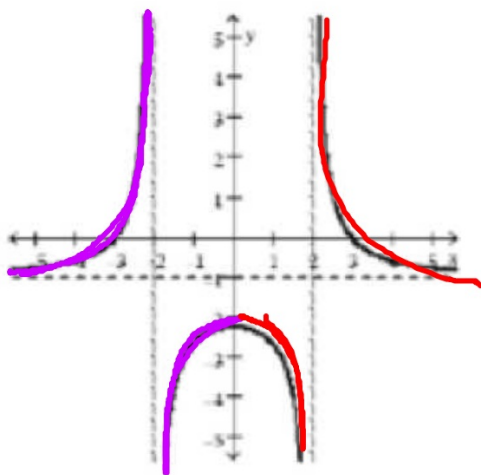
b)

incr: $(-3, 0)$
$(2, \infty)$

decr: $(0, 2)$

Ex 1) Determine the intervals on which the graph is increasing and decreasing.
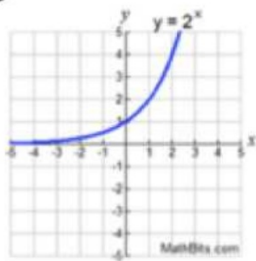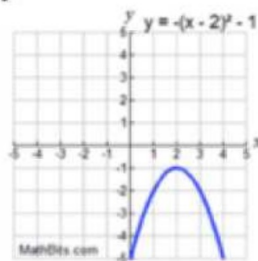
c)

Positive and Negative

The "positive" regions of a function are those intervals where the function is above the x-axis. Simply, it is where the y-values are positive (not zero).

The "negative" regions of a function are those intervals where the function is below the x-axis. Simply, it is where the y-values are negative (not zero).
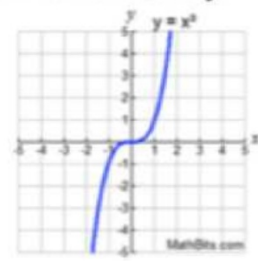
| Some functions are positive over their entire domain (All points above the x-axis.)	Some functions are negative over their entire domain. (All points below the x-axis.)	Some functions have both positive and negative regions. (Points are above and below the x-axis)
$y = 2^x$	$y = -(x-2)^2 - 1$	$y = x^3$

*When stating the intervals on which a function is positive or negative do NOT include zeros.

Ex 2) Determine the intervals on which the graph is positive and negative.
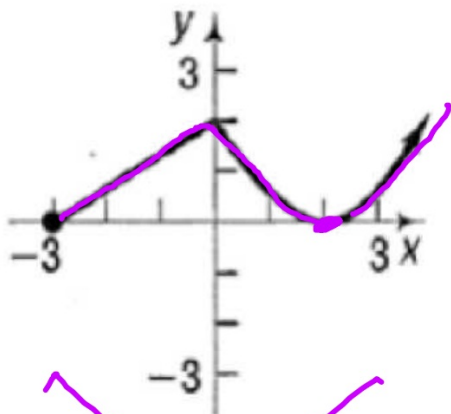
a)
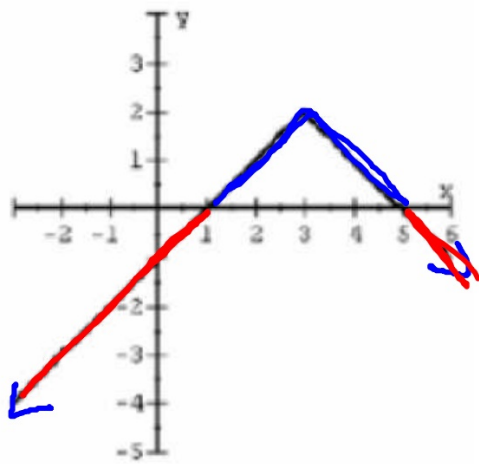
pos: $(1, 5)$

neg: $(-\infty, 1) \cup (5, \infty)$

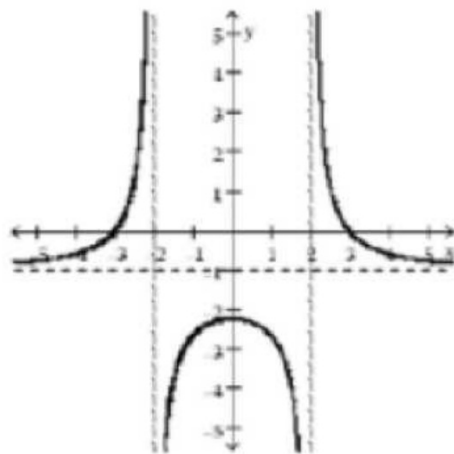Ex 2) Determine the intervals on which the graph is positive and negative.

b)

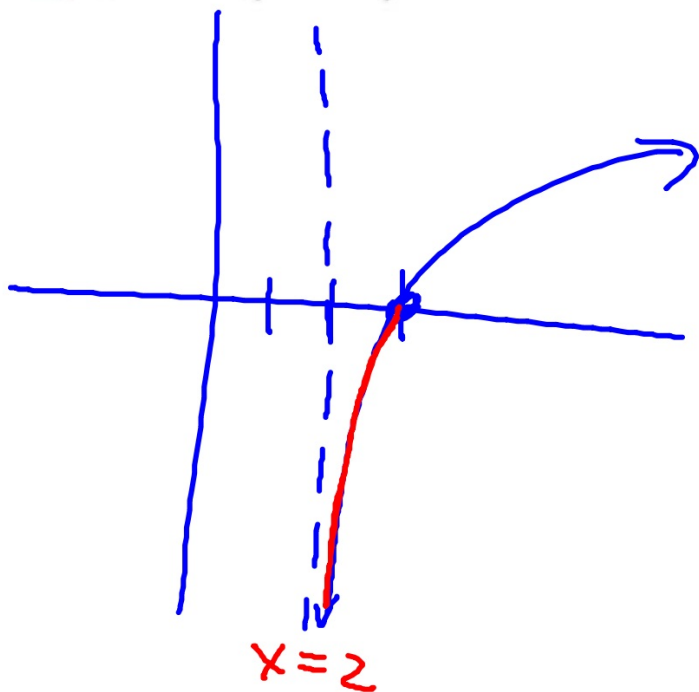
pos : $(-3, 2)$

$(2, \infty)$

$(-3, \infty)$

Ex 2) Determine the intervals on which the graph is positive and negative.

c)

Ex 3) Sketch the function. Then determine the intervals on which the function is increasing, decreasing, positive and negative.

a) $y = \ln(x-2)$

xint:
$$e^0 = e^{\ln(x-2)}$$
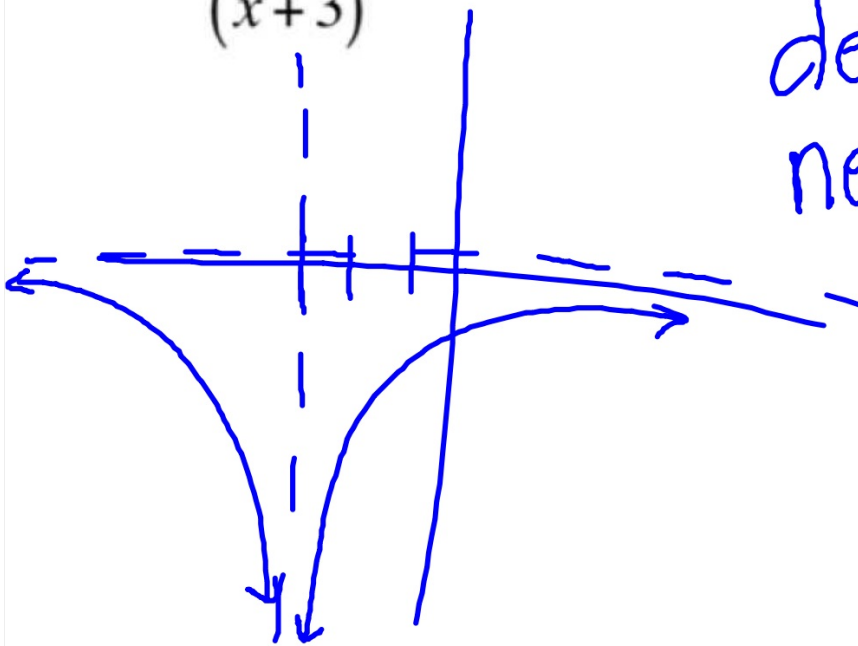$$1 = x - 2$$
$$3 = x$$

incr: $(2, \infty)$

pos: $(3, \infty)$

neg: $(2, 3)$

$x = 2$

Ex 3) Sketch the function. Then determine the intervals on which the function is increasing, decreasing, positive and negative.

b) $y = \dfrac{-1}{(x+3)^2}$

incr: $(-3, \infty)$

decr: $(-\infty, -3)$

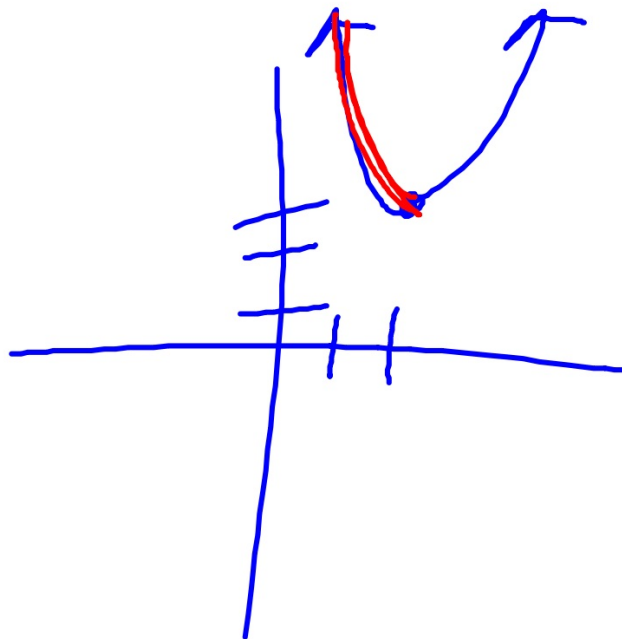neg: $(-\infty, -3) \cup$
$(-3, \infty)$

Ex 3) Sketch the function. Then determine the intervals on which the function is increasing, decreasing, positive and negative.
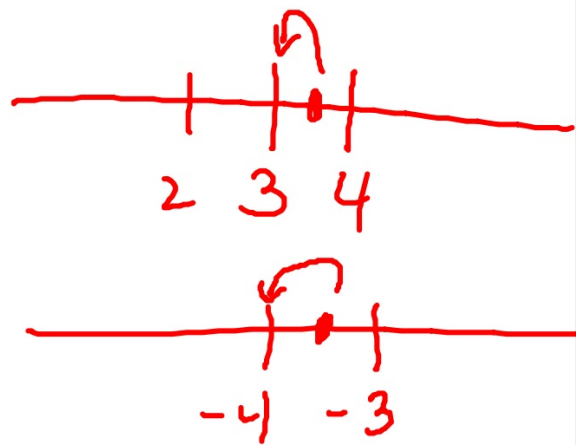
c) $y = x^2 - 4x + 7$

$V(2, 3)$

$\dfrac{-b}{2a}$

$$f(x) = \lfloor x \rfloor$$

$$f(3.5) = 3$$

$$f(-3.5) = -4$$

4.) $f(x) = \begin{cases} -3, & x \le 2 \\ x+2, & 2 < x \le 4 \\ 3x-6, & x > 4 \end{cases}$

$x \le 2$		$2 < x \le 4$		$x > 4$	
x	y	x	y	x	y
•2	−3	○2	4	○4	6
•1	−3	•4	6	•5	9