Linear functions (taken from http://www.asms.net/brewer/precal/PrecalculusNotes.pdf)

A linear function is one of the form $f(x) = mx + b$, where m is the slope of the line and b is the y-intercept. $y = mx + b$ is called the slope-intercept form of the equation of a line.
The slope of a linear function can be found by taking the ratio of change in y-values over the change in x-values.
$m = \frac{y_2 - y_1}{x_2 - x_1} = "\frac{rise}{run}"$
Given the slope m and a point (x_1, y_1) on a line, the slop-intercept form can be easily found by plugging these values into the point-slope equation: $y - y_1 = m(x - x_1)$.
Lines with a 0-slope are called horizontal lines and are of the form $y = k$ for some constant k. Vertical lines are said to have "no slope" and are of the form $x = k$.
Two lines in a plane are parallel if they never intersect. Two lines are perpendicular if their intersection forms a 90° angle.
Let l_1 be the graph of $f_1(x) = m_1x + b_1$ and let l_2 be the graph of $f_2(x) = m_2x + b_2$. l_1 and l_2 are parallel if $m_1 = m_2$. This is denoted $l_1 \parallel l_2$. l_1 and l_2 are perpendicular if $m_1 = -\frac{1}{m_2}$. This is denoted $l_1 \perp l_2$.

slope-intercept form

$y = mx + b$

point-slope equation

$y - y_1 = m(x - x_1)$

Slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

horizontal lines

$y = k$ for some constant k (0 slope)

vertical lines

$x = k$ (no slope)

Parallel

$m_1 = m_2$

Perpendicular

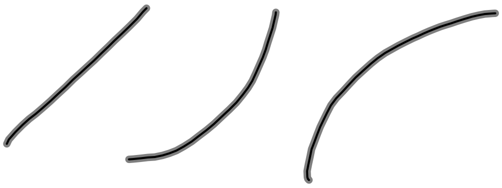
$$m_1 = -\frac{1}{m_2}$$

1.5 More on Functions

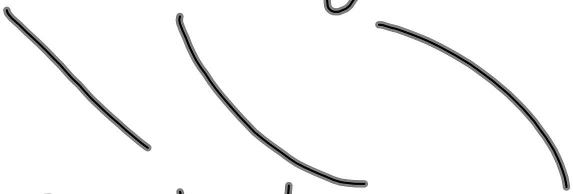
Topics to cover in this section:
- identifying intervals on which a function is increasing, decreasing, constant
- identifying relative maxima and minima
- graphing piecewise functions
- greatest integer function

i.e. LOTS OF GRAPHING TODAY!

increasing



decreasing

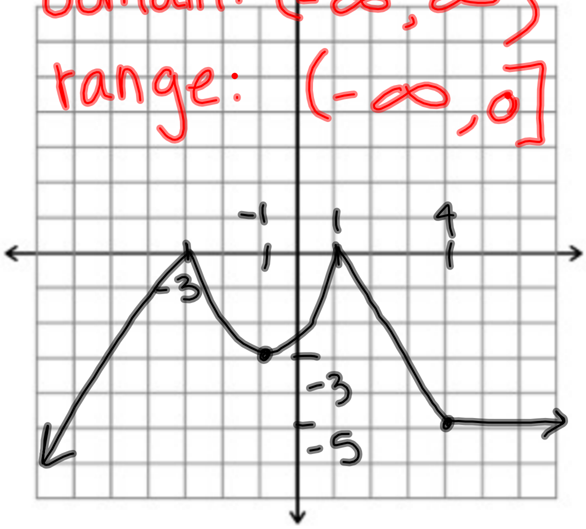


constant

horizontal

domain: $(-\infty, \infty)$

range: $(-\infty, 0]$



constant: $(4, \infty)$

increasing: $(-\infty, -3) \cup (-1, 1)$

decreasing: $(-3, -1) \cup (1, 4)$

increasing:

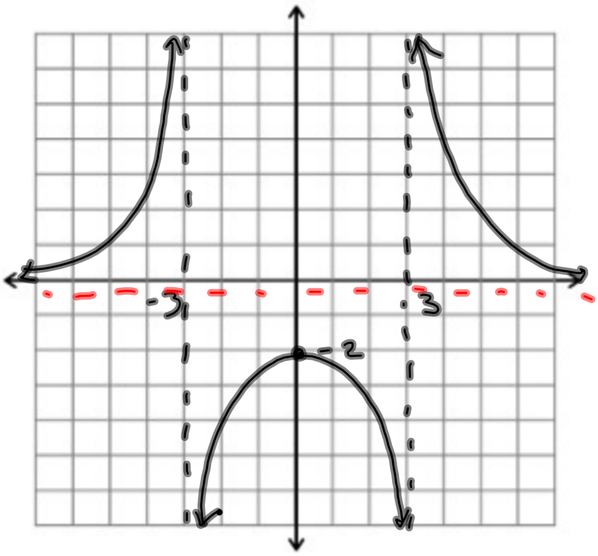
$(-\infty, -3) \cup (-3, 0)$

decreasing:

$(0, 3) \cup (3, \infty)$

constant:

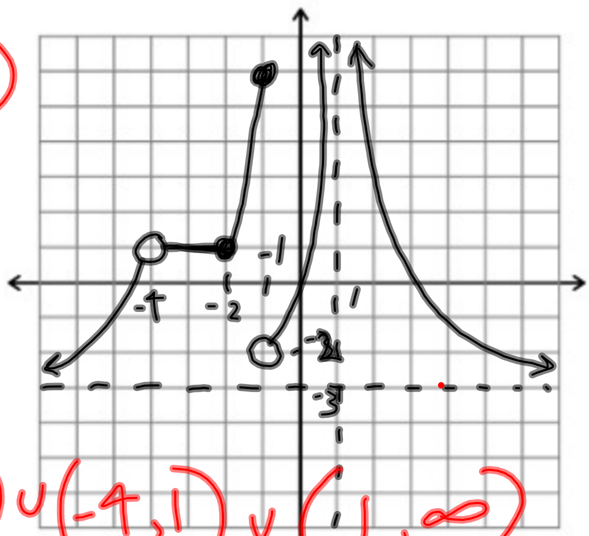
—



domain:

$\{x \mid x \neq -3, 3\} = (-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

range: $(-\infty, -2] \cup (0, \infty)$



increasing:

$(-\infty, -4) \cup (-2, -1) \cup (-1, 1)$

decreasing:

$(1, \infty)$

constant:

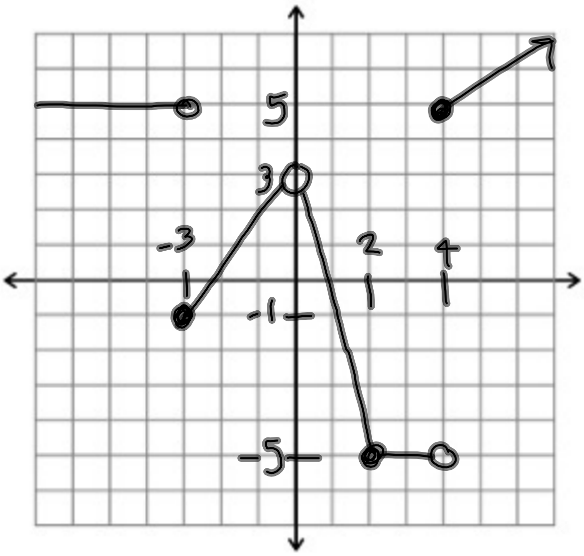
$(-4, -2)$

domain:

$\{x \mid x \neq -4, 1\} = (-\infty, -4) \cup (-4, 1) \cup (1, \infty)$

range:

$(-3, \infty)$



increasing:

$(-3, 0) \cup (4, \infty)$

decreasing:

$(0, 2)$

constant:

$(-\infty, -3) \cup (2, 4)$

domain:

$(-\infty, 0) \cup (0, \infty)$

range:

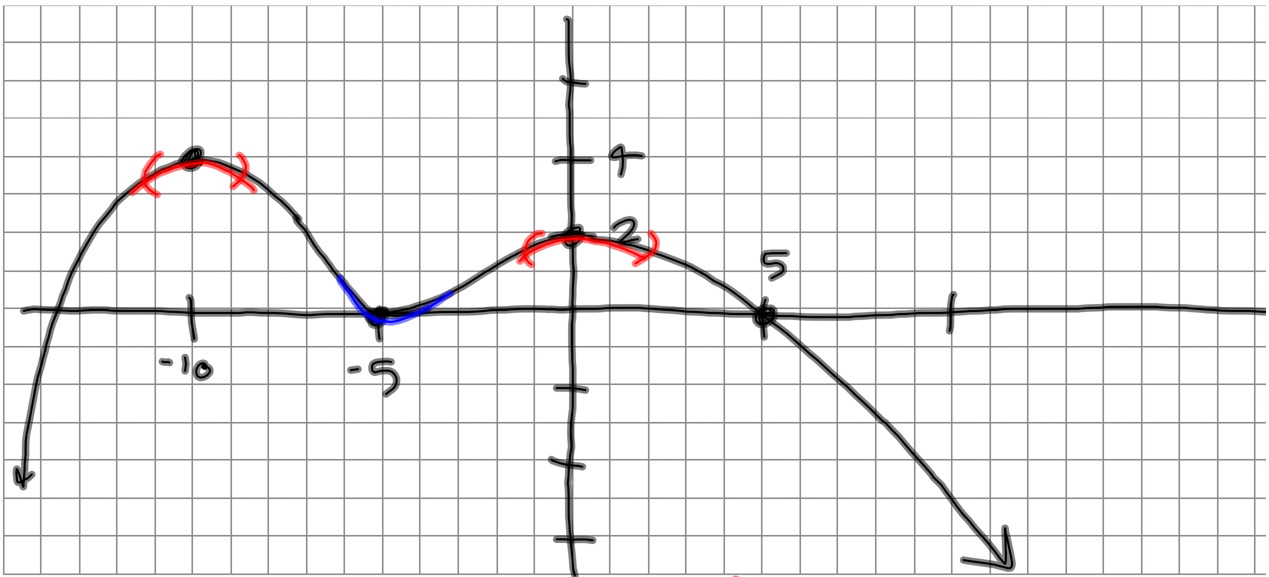
$[-5, 3) \cup [5, \infty)$

Maxima & Minima =

Extrema of a Function

Absolute max/min refer to single highest or lowest values on the graph (if they exist)

Relative max/min refer to highest & lowest values in small intervals

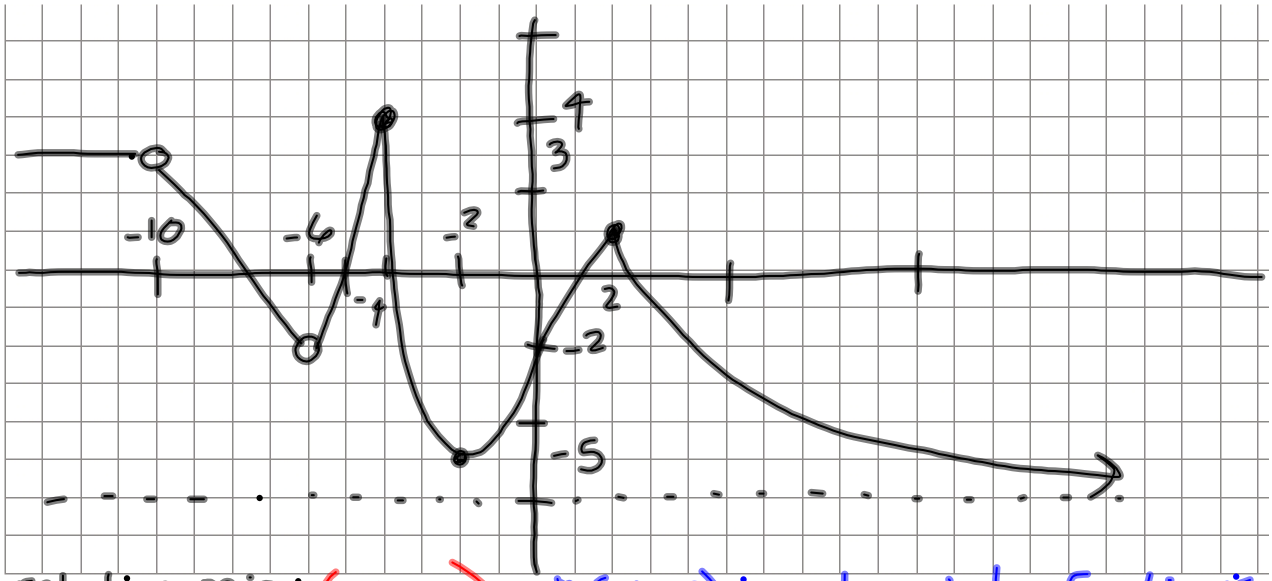


relative max: (-10,4) & (0,2)

relative min: (-5,0)

absolute max: 4, occurs @ x=-10., (-10,4)

absolute min: none



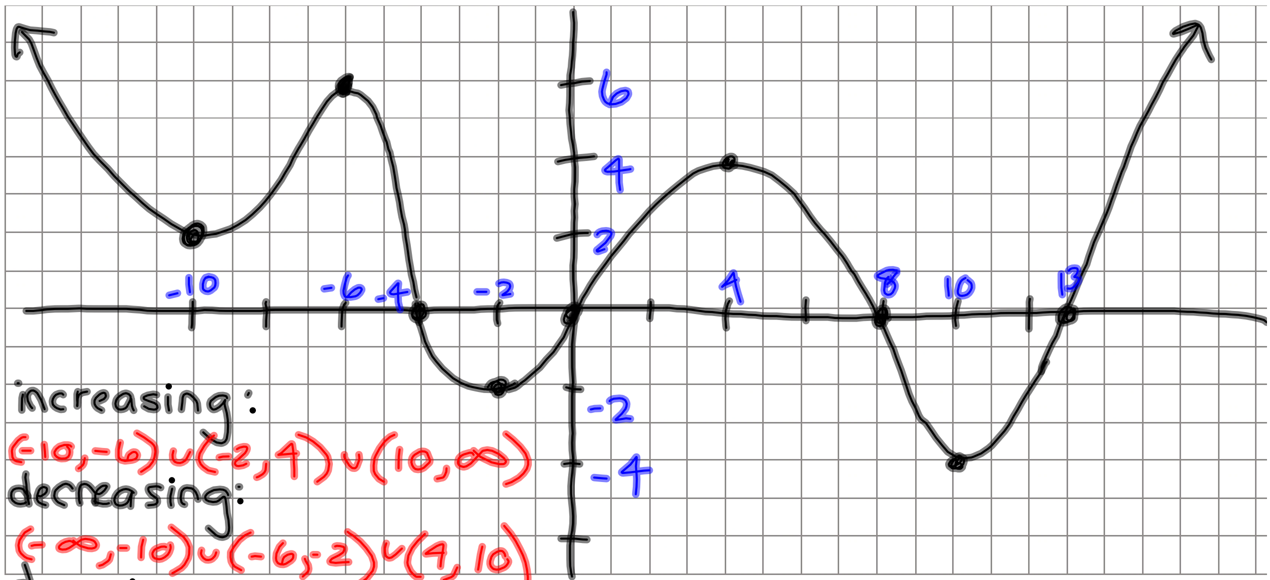
relative min: (-2, -5) * (-6, -2) is not a min bc function is not defined there)

relative max: (-4, 4) & (2, 1)

range: (-6, 4]

absolute min: none

absolute max: (-4, 4)



increasing:

(-10, -6) ∪ (-2, 4) ∪ (10, ∞)

decreasing:

(-∞, -10) ∪ (-6, -2) ∪ (4, 10)

domain:

(-∞, ∞)

range:

[-4, ∞)

relative max:

(-6, 6), (4, 4)

relative min:

(-2, -2), (10, -4), (-10, 2)

abs. max:

none

abs. min:

(10, -4)

Homework (to be turned in on Friday)

Assigned Monday: 1.2 #15-29odd; 40,41,42,45,48

Assigned Wednesday: 1.4 #35-41odd; 53-63odd

Assigned Thursday: 1.5#1-16all; ~~47-61odd,69-74all~~