Turn in HW #2

- 1.5: #55-61odd (determining function values of & graphing piecewise functions)
  #69-74all (finding domain, range & equation given graph of a piecewise function)
- 1.6: #23,29,31; 45, 49, 51; 63, 71,75; 81, 83 (algebra of functions)
- 1.7: #9,11,21,23; 39-47odd (symmetry tests)
  #59-69odd; 77-83 odd

$f(x) = x+5$; $g(x) = \sqrt{2x}$

$(-\infty, \infty)$ $[0,\infty)$ Domain:

$(f+g)(x) = x+5+\sqrt{2x}$ $[0,\infty)$

$(f-g)(x) = x+5-\sqrt{2x}$ $[0,\infty)$

$(fg)(x) = (x+5)\sqrt{2x}$ $[0,\infty)$

$\left(\frac{f}{g}\right)(x) = \frac{x+5}{\sqrt{2x}}$ $(0,\infty)$

$(f \circ g)(x) = \sqrt{2x} + 5$ $[0,\infty)$

$(g \circ f)(x) = \sqrt{2(x+5)}$ $[-5,\infty)$

2.4 - Analyzing Graphs of Quadratic Functions

Standard form: $f(x) = ax^2 + bx + c$

The graph of a quadratic function is a parabola.

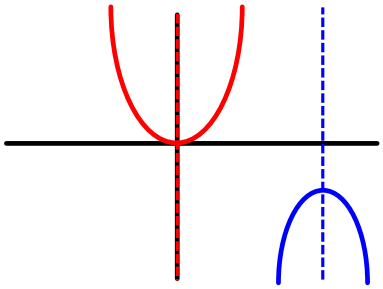
We can rewrite the standard form into a more useful form:

$\boxed{f(x) = a(x-h)^2 + k}$, where

Vertex: (h, k)

Axis of symmetry: $x = h$

(vertical line through the vertex)



If $a > 0$, parabola opens upward, vertex is a minimum

If $a < 0$, parabola opens downward, vertex is a maximum

2.4

$f(x) = a(x-h)^2 + k$

$x^2 - 2xh + h^2$

8. $f(x) = x^2 + 2x + 6$

$= x^2 + 2x + 1 + 6 - 1$

$f(x) = (x+1)^2 + 5$

vertex: $(-1, 5)$

opens: up ↑

axis of symmetry: $x = -1$

increasing: $(-1, \infty)$

decreasing: $(-\infty, -1)$

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

range: $[5, \infty)$

abs max: none

abs min: 5 @ $x = -1$

$y = a f(bx + c) + d$

vertical scale

horizontal scale

apply by dividing x-coord's by b

multiply y-coord's by a to apply

Know for test on Friday:

- all definitions (usually underlined in notes) and formulas in 1.2-1.7 & (2.4) (relating to functions and graphs of functions)
- given a graph, be able to describe characteristics of the graphed function (domain, range, increasing/decreasing/constant, relative & absolute extrema, x- and y-intercepts, possibly equation)
- given an algebraic equation for either a transformed simple algebraic function or a piecewise function consisting of simple algebraic functions, be able to graph the function and describe characteristics of it (domain, range, increasing/decreasing/constant, relative & absolute extrema, x- and y-intercepts)
- determine the slope-intercept equation of a line given either two points, a point and the slope, or a point and some other piece of information that indicates what the slope is
- given more than one function, construct algebraic combinations and/or compositions of the functions and determine the domain of the result
- evaluate a function at both number values and for variable expressions
- determine if a function is even or odd
- determine if the graph of a function is symmetric with respect to the x-axis, y-axis, or neither
- given a verbal description of a transformation of a function, write the equation
- given the convenient form of the equation for a parabola, determine the vertex and axis of symmetry (in addition to above-listed domain, etc.)

$f(x) = x^2 - x + 1$

Evaluate & simplify

$$\frac{f(x+h) - f(x)}{h}$$

$$\frac{(x+h)^2 - (x+h) + 1 - (x^2 - x + 1)}{h} =$$

$$\frac{x^2 + 2xh + h^2 - x - h + 1 - x^2 + x - 1}{h} =$$

$$\frac{h(2x + h - 1)}{h} = \boxed{2x + h - 1}$$

$$f(x) = \frac{x+2}{x-1}$$

$$\frac{\frac{x+h+2}{x+h-1} - \frac{x+2}{x-1}}{h}$$

$$\frac{(x+h+2)(x-1) - (x+2)(x+h-1)}{(x+h-1)(x-1)} \cdot \frac{1}{h}$$

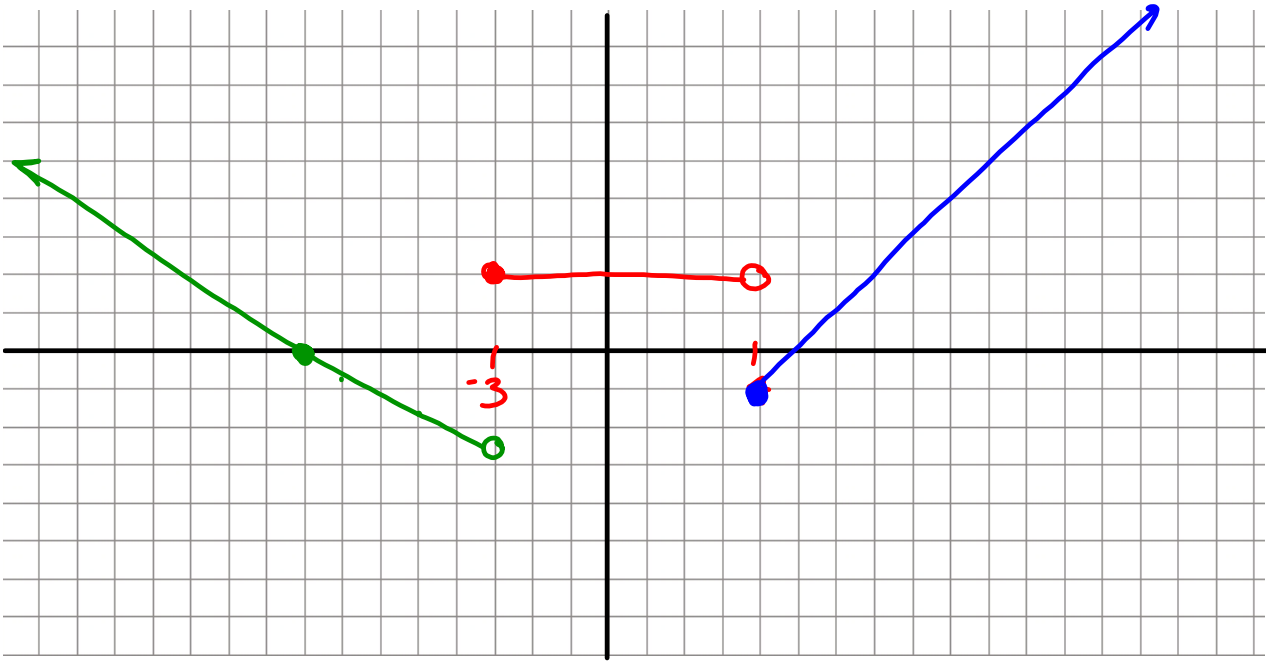
$$\frac{x^2+xh+2x-x-h-2 - (x^2+xh-x+2x+2h-2)}{(x+h-1)(x-1)h}$$

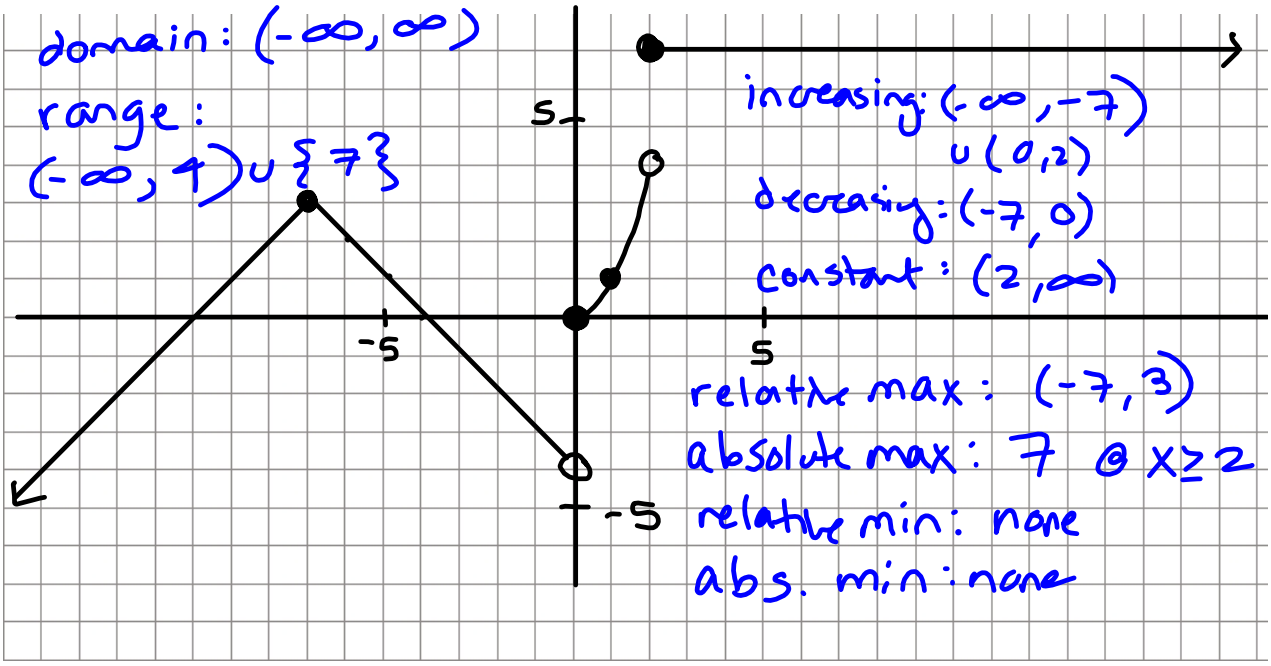
$$\frac{-h-2h}{(x+h-1)(x-1)h} = \frac{-3h}{(x+h-1)(x-1)h} = \frac{-3}{(x+h-1)(x-1)}$$

$\frac{a+b}{a}$!

$$f(x) = \begin{cases} -\frac{1}{2}x - 4 & , x < -3 \\ 2 & , -3 \le x < 4 \\ x - 5 & , x \ge 4 \end{cases}$$

domain/range?
max/min?





max/min?

$$f(x) = \begin{cases} -|x+7|+3 & , x<0 \\ x^2 & , 0 \leq x < 2 \\ 7 & , x \geq 2 \end{cases}$$

Homework for Test #1:

HW #1 (submitted Fri, 08/15)
- 1.2: #15-29odd, #40,41,42,45,48, #59-70all
- 1.4: #35-47odd; 53-63odd
- 1.5: #1-16all, #47-53odd

HW #2 (submitted Fri, 08/22)
- 1.5:#55-61odd (determining function values of & graphing piecewise functions)
  #69-74all (finding domain, range & equation given graph of a piecewise function)
- 1.6:#23,29,31; 45, 49, 51; 63, 71,75; 81, 83 (algebra of functions)
- 1.7:#9,11,21,23; 39-47odd (symmetry tests)
  #59-69odd; 77-83 odd; (graphing with transformations)

HW #3 (due Mon, 08/25 test day)
- **1.7: #93-101odd; 115-121odd** (graphing with transformations)
- **2.4: #1,2; 15-22all; 23-27odd** (graphing and describing characteristics of parabolas)

Test #1 - Mon, 8/25

MATH LAB SUNDAY 7-9!