Pages 2 & 3 were the big struggle.
I have recorded your scores for each of those pages.
I'll hand out a worksheet Monday based on this material.
I'll split the difference with you.
(If you earned 35 out of 45 and get the worksheet perfect. I'll give you 5 test points.)

Feb 18-8:48 AM

§3.1

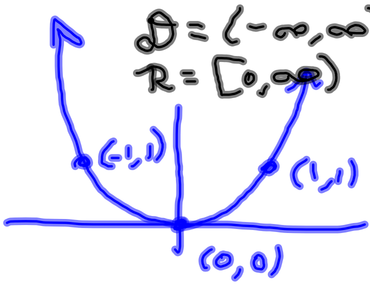
$g(x) = 3(x+2)^2 + 5$

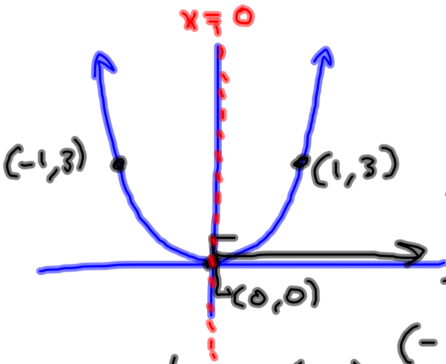
Test 2 version of graph:

$x^2 = f(x) \longrightarrow 3x^2 = 3f(x)$

$\mathcal{D} = (-\infty, \infty)$

$\mathcal{R} = [0, \infty)$





$\mathcal{D} = (-\infty, \infty)$

$\mathcal{R} = [0, \infty)$

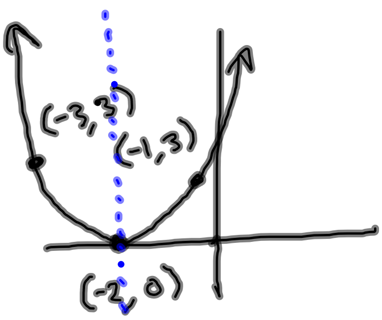
Increasing: $[0, \infty)$

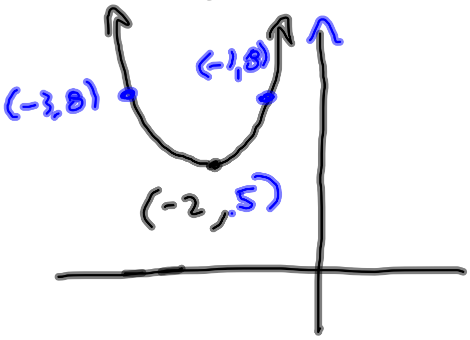
Decreasing: $(-\infty, 0]$

Vertex: $(0,0)$

Axis of symmetry: $x = 0$

$3(x+2)^2 \longrightarrow 3(x+2)^2 + 5 = g(x)$





$\mathcal{D} = \mathbb{R}$

$\mathcal{R} = \mathbb{R}^+ = [0, \infty)$

$\mathcal{D} = \mathbb{R}$

$\mathcal{R} = [5, \infty)$

Inc: $[-2, \infty)$ Dec: $(-\infty, -2]$

AOS: $x = -2$

$x = -2$

Feb 18-8:56 AM

Test 3 Version of

$g(x) = 3(x+2)^2 + 5$

$a(x-h)^2 + k$ Standard Form

$a = 3 > 0$ opens up

Example cook!

$3(x^2+4x+4) - 5$

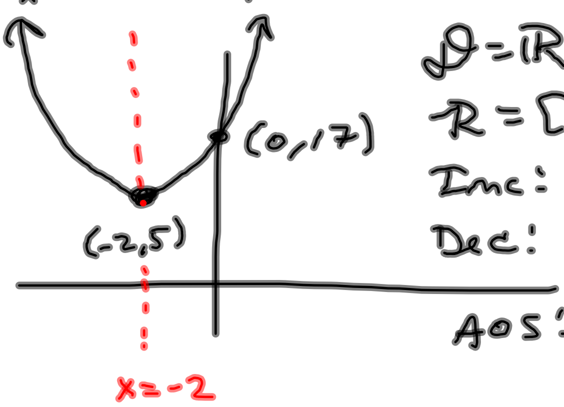
$= 3x^2 + 12x + 7$

Vertex $= (h, k) = (-2, 5)$

Axis of symmetry: $x = -2$

y-intercept: $g(0) = 3(0+2)^2 + 5 = 17 \to (0, 17)$

x-intercept(s): None.



$\mathcal{D} = \mathbb{R}$

$\mathcal{R} = [5, \infty)$

Inc: $[-2, \infty)$

Dec: $(-\infty, -2]$

AOS: $x = -2$

Feb 18-9:09 AM

$3(x^2+4x+4)-5$
$= 3x^2+12x+7$

Graph $3(x+2)^2-5 = g(x)$

New on this one is x-intercepts.

$g(0) = 3(2)^2-5$
$= 7 \rightsquigarrow (0,7)$

Need x-intercepts:

$3(x+2)^2-5=0$

$3(x+2)^2=5$

$(x+2)^2=\frac{5}{3}$

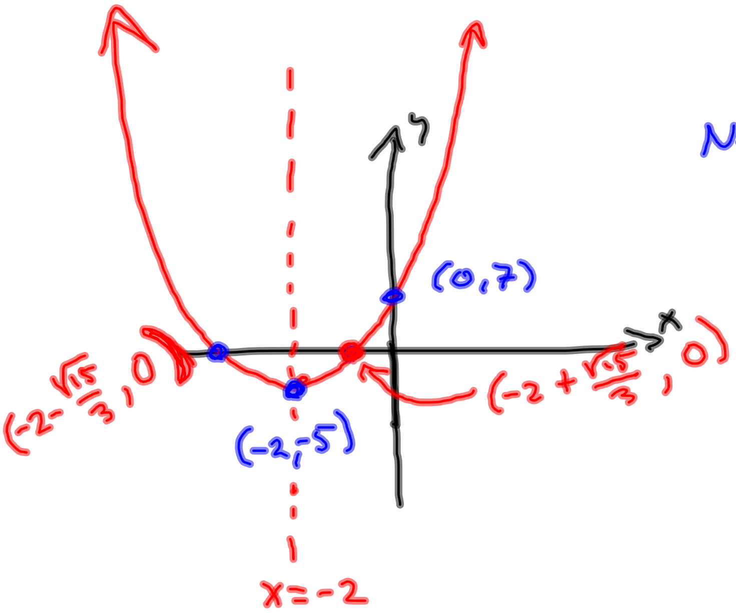
$\sqrt{(x+2)^2}=\sqrt{\frac{5}{3}}$

$|x+2|=\sqrt{\frac{5}{3}}$

$x+2=\pm\sqrt{\frac{5}{3}}$

$x=-2\pm\sqrt{\frac{5}{3}}$

$=-2\pm\frac{\sqrt{15}}{3}$



Simplify $\sqrt{\frac{5}{3}}$

$=\frac{\sqrt{5}}{\sqrt{3}}=\frac{\sqrt{5}}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}$

$=\frac{\sqrt{5}\sqrt{3}}{3}=\frac{\sqrt{15}}{3}$

The previous example, from scratch

$$g(x) = 3x^2 + 12x + 7$$

complete the square.

$$= 3(x^2 + 4x \qquad) + 7$$

$$= 3(x^2 + 4x + 2^2 - 4) + 7$$

$$= 3(x^2 + 4x + 2^2) + 3(-4) + 7$$

moved the -4 out of the quantity.

$$= 3(x+2)^2 - 12 + 7$$

$$= 3(x+2)^2 - 5$$

Turn to previous page.

$$g(x) = 3x^2 + 12x + 7$$

$$\frac{g(x)}{3} = \frac{3x^2 + 12x + 7}{3}$$

$$\frac{g(x)}{3} = x^2 + 4x + \frac{7}{3}$$

$$\frac{g(x)}{3} + 4 = x^2 + 4x + 2^2 + \frac{7}{3}$$

$$\frac{g(x)}{3} + 4 = (x+2)^2 + \frac{7}{3}$$

$$\frac{g(x)}{3} = (x+2)^2 + \frac{7}{3} - 4$$

$$g(x) = 3(x+2)^2 + 7 - 12$$

$$g(x) = 3(x+2)^2 - 5$$

$3^{\underline{rd}}$ Way

$$(h, k) = \left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$$

for $f(x) = ax^2 + bx + c$

$3x^2 + 12x + 7$

$a = 3,\ b = 12,\ c = 7$

$$-\frac{b}{2a} = -\frac{12}{2(3)} = -\frac{12}{6} = -2 = h$$

$$f\left(-\frac{b}{2a}\right) = f(-2) = 3(-2)^2 + 12(-2) + 7$$

$$= 12 - 24 + 7$$

$$= -5 = k$$

$(h, k) = (-2, -5)$

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

$= a(x-(-2))^2 - 5$

$= a(x+2)^2 - 5$

$= \boxed{3(x+2)^2 - 5}$

Solve $f(x) = x^2 - 3x + 2 > 0$

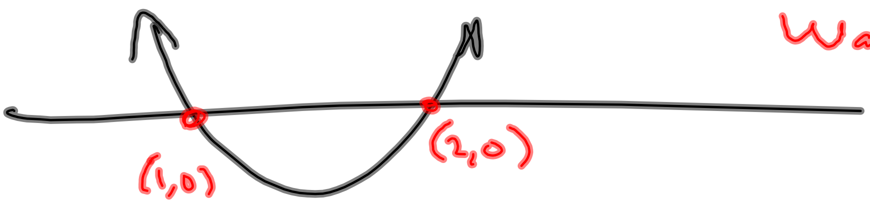
$\Rightarrow \quad (x-2)(x-1) > 0$

$\boxed{x-2 > 0 \quad \text{OR} \quad x-1 > 0}$

Classic Student Mistake.
Earns Zip.

Visual Solution

Parabola
opens up
x-intercepts $(1,0)$, $(2,0)$



Want $f(x) > 0$
Find x's that
make it so.

$f(x) > 0$?

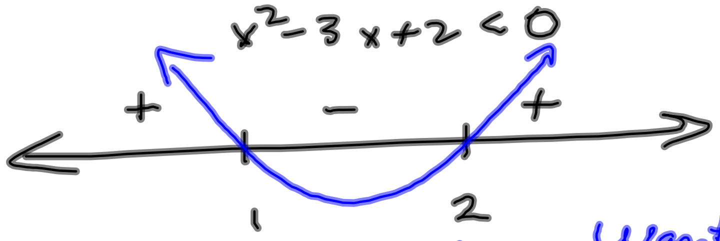
$(-\infty, 1)$ $\quad (1,2)$ $\quad (2, \infty)$

$\boxed{\text{Solution Set: } (-\infty, 1) \cup (2, \infty)}$

Solve $x^2-3x+2 \geq 0$

$(-\infty, 1] \cup [2, \infty)$

$x^2-3x+2 < 0$



Sign Pattern

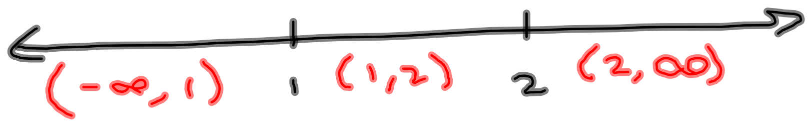
$\boxed{x \in (1,2)}$

want < 0

want "—"

$(x-1)(x-2) > 0$ Test Value Method

$x = 1, 2$ are critical values



want > 0

	Test		
$(-\infty, 1)$	0	$(0-1)(0-2) = 2 > 0$	Yes
$(1,2)$	$\frac{3}{2}$	$(\frac{3}{2}-1)(\frac{3}{2}-2) = (\frac{1}{2})(-\frac{1}{2}) = -\frac{1}{4} < 0$	No
$(2, \infty)$	3	$(3-1)(3-2) = (2)(1) = 2 > 0$	Yes

$\boxed{x \in (-\infty, 1) \cup (2, \infty)}$

SI 3-4 Mon BH 140 (Except this one)

3-4 Thurs BH 140

$\{x \mid x \geq -5 \text{ and } g(x) \in \mathcal{D}(f)\}$

$g(x) \in \mathcal{D}(f)$ means $\quad \mathcal{D}(f) = \{x \mid x \neq -3\}$

$g(x) \neq -3$

$\sqrt{x+5} \neq -3$ is always true. No restriction.

$\to \mathcal{D}(f \circ g) = [-5, \infty)$

$(f \circ g)(x) \neq (f \cdot g)(x)$

$f(g(x)) \neq f(x) \cdot g(x)$

$$f\left(\boxed{g(x)}\right) = \frac{\boxed{g(x)} + 2}{\boxed{g(x)} + 3} = \frac{\sqrt{x+5} + 2}{\sqrt{x+5} + 3}$$

$f(x+k)$ $\quad$ $kf(x)$

$f(x-k)$ $\quad$ $f(kx)$

$f(x)+k$

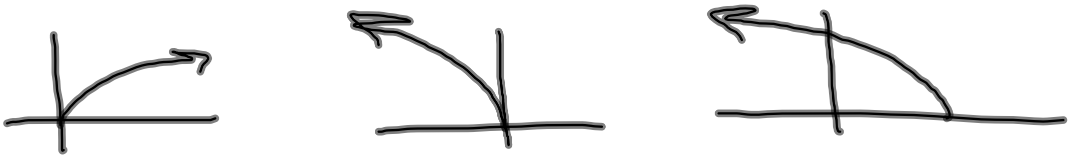
$f(x)-k$ $\quad$ $\boxed{f(-x+k)}$

$\sqrt{(3-x)}$

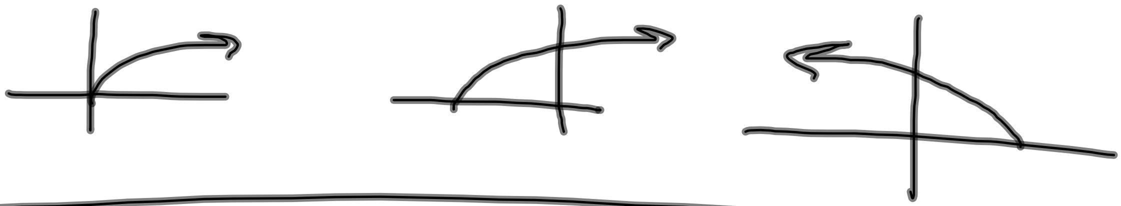
$x \longrightarrow x+3 \longrightarrow -x+3 = -(x-3)$

$x \longrightarrow -x \longrightarrow -(x-3)$

$$\sqrt{x} \longrightarrow \sqrt{-x} \longrightarrow \sqrt{-(x-3)}$$



$$\sqrt{x} \longrightarrow \sqrt{x+3} \longrightarrow \sqrt{-x+3}$$



$\sqrt{-x} \longrightarrow \sqrt{-x+3}$ is

NOT LEFT 3. you're replacing x by $x-3$, to keep it in terms of known "moves"

$-x \longrightarrow -(x-3) = -x+3$