

By instructions

$$f(x) = x^2 + 4x + 2^2 - 4 = (x+2)^2 - 4$$

$\frac{4}{2} = 2 \rightsquigarrow 2^2$

$(h, k) = (-2, 4)$

Generally, since you did this work, solve for x-intercepts by completing

$$(x+2)^2 - 4 = 0$$

$$(x+2)^2 = 4$$

$$\sqrt{(x+2)^2} = \sqrt{4}$$

$$|x+2| = 2$$

$$\rightarrow x+2 = \pm 2$$

$$x = -2 \pm 2$$

$x = 0 \rightsquigarrow (0, 0)$   
 $x = -4 \rightsquigarrow (-4, 0)$

$$b. \quad y = 3x^2 - 12x + 1 \quad y\text{-int: } (0, 1)$$

$$= 3(x^2 - 4x) + 1$$

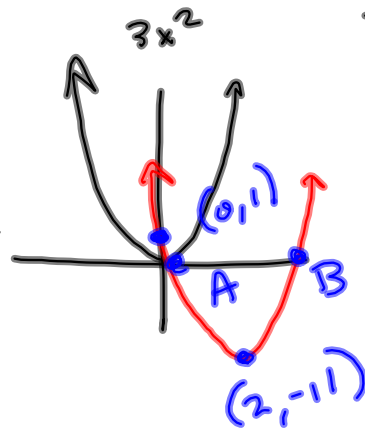
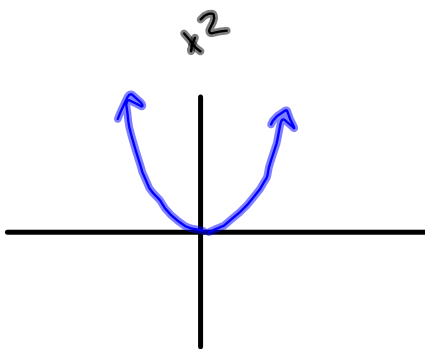
$$= 3(x^2 - 4x + 2^2) + 1 - 3(4)$$

$$\downarrow$$

$$\frac{4}{2} = 2 \rightarrow 2^2 = 4$$

$$= 3(x-2)^2 - 11 \quad (h, k) = (2, -11)$$

$x^2 \rightarrow 3x^2$   
 $(x, y) \rightarrow (x, 3y)$  Right 2    Down 11



$$3(x-2)^2 - 11 \quad 5 \in \Gamma_0$$

$$3(x-2)^2 = 11$$

$$(x-2)^2 = \frac{11}{3}$$

$$x-2 = \pm \sqrt{\frac{11}{3}}$$

$$x = 2 \pm \sqrt{\frac{11}{3}}$$

$$B = (2 + \sqrt{\frac{11}{3}}, 0) \quad \text{Right out}$$

$$A = (2 - \sqrt{\frac{11}{3}}, 0) \quad \text{Left out}$$

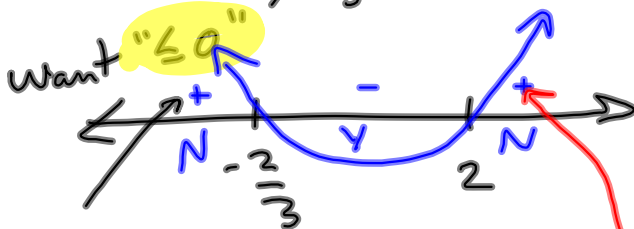
$$3x^2 - 4x - 4 \leq 0$$

$$3x^2 - 6x + 2x - 4 \leq 0$$

$$3x(x-2) + 2(x-2) \leq 0$$

$$(x-2)(3x+2) \leq 0$$

$x = 2, -\frac{2}{3}$  "critical"



$$x \in [-\frac{2}{3}, 2]$$

Test:

$$(-\infty, -\frac{2}{3})$$

$$(-\frac{2}{3}, 2) \quad -$$

$$(2, \infty) \quad x=3$$

$$(3-2)(3(3)+2) = (+)(+) = +$$

$$a=3, b=-4, c=-4$$

$$b^2 - 4ac = (-4)^2 - 4(3)(-4)$$

$$= 16 + 48$$

$$= 64 \rightarrow \sqrt{64} = 8$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

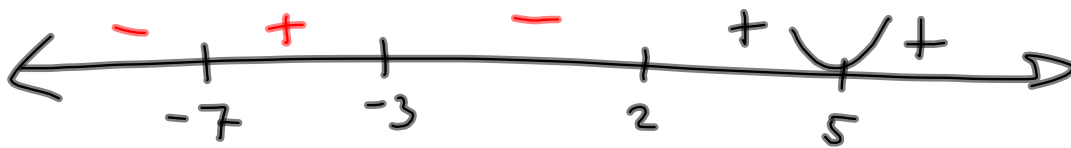
$$= \frac{4 \pm 8}{2(3)} = \frac{4 \pm 8}{6}$$

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

$$(x-2)(3x+2)$$

$$\overbrace{(x-2)^1(x+3)^1(x-5)^2(x+7)^3} \geq 0$$

+   +   +   +



Near  $x=5$  :

$$(5-2)(5+3)(x-5)^2(5+7)$$

$$(3)(8)(35)(x-5)^2$$

+ + +

One way to look at it

$$x \in [-7, -3] \cup [2, \infty)$$

$$(x-2)(x+3)(x-5)^2(x+7)^3 > 0$$

$$x \in (-7, -3) \cup (2, 5) \cup (5, \infty)$$

Had to throw out

$$x = -7, -3, 2, 5$$

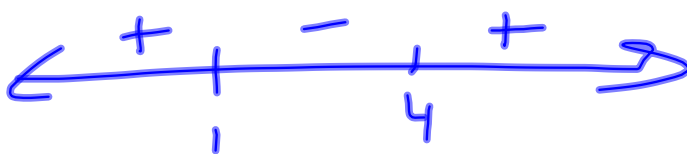
STRICT

$$5x - x^2 < 4$$

$$-x^2 + 5x - 4 < 0$$

$$x^2 - 5x + 4 > 0$$

$$(x-4)(x-1) > 0$$



$$x \in (-\infty, 1) \cup (4, \infty)$$

$$x=5 : (5-4)(5-1) \\ (1)(4) = 4 > 0 \quad +$$



Midterm:

Quiz stuff is all fair game.  
Practice Test stuff, too.

No Notes / other stuff

No graphing calculator.

No cell phone.

Bonus - Complete the square when  
leading coefficient  $\neq 1$ .  
Like #16 on quiz 7.

Legible Name (5pts)

Bonus Find all zeros of a 4<sup>th</sup>-degree  
polynomial Rational zeros  
Descartes  
Bounds on real zeros.

Non-Bonus:

Given zeros, write poly. in factored  
form.

E Polynomial of degree 3 with  
zeros @  $x=1, 2, 3+i$  (Factored form)

$$(x-1)(x-2)(x-(3+i))$$

Same question, only one with  
REAL coefficients.

Impossible.

Same question as previous, but degree 4

$$(x-1)(x-2)(x-(3+i))(x-(3-i))$$

... degree 5 ?

$$(x-1)(x-2)(x-(3+i))(x-(3-i))$$

Shared Work

Joe in 3 hrs

Same time:

Pete in 5 hrs

$$\frac{1}{3}t + \frac{1}{5}t = 1$$

Pete starts an hour late:

$$\frac{1}{3}t + \frac{1}{5}(t-1) = 1$$

↑  
How long Pete worked.