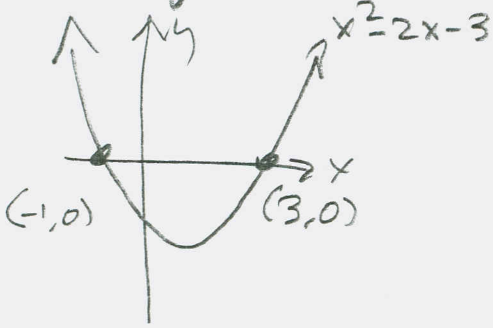
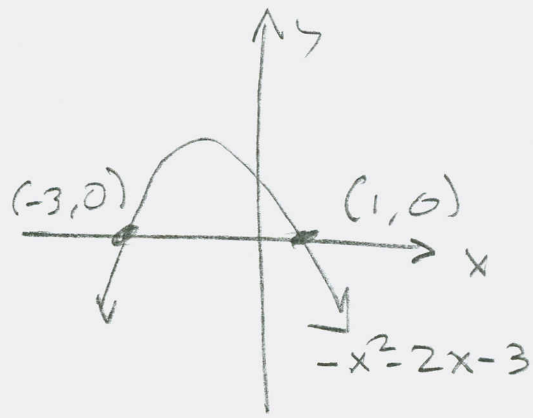
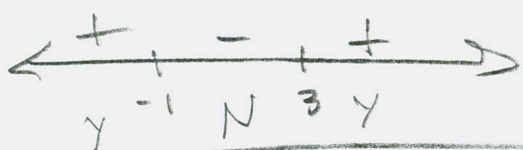
121 §3.1 II #s 59, 60, 65, 72, 73, 78, 90, 92, 103

#s 59-64 Use the graphs to solve the inequalities



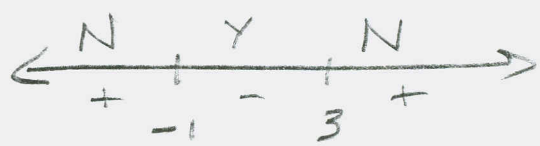


(59) $x^2-2x-3 \geq 0$



$\boxed{(-\infty, -1] \cup [3, \infty)}$

(60) $x^2-2x-3 < 0$



$\boxed{(-1, 3)}$

#s 65-76 Solve each inequality by test-point method. State sol'n in interval notation.

(65) $x^2-4x+2 < 0$

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

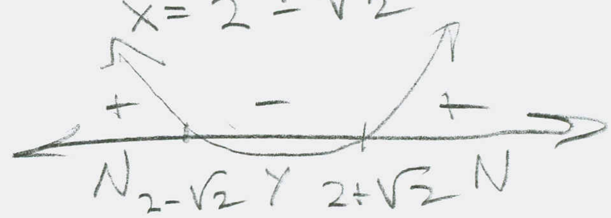
$x^2-4x = -2$

$x^2-4x+2^2 = -2+4$

$(x-2)^2 = 2$

$x-2 = \pm\sqrt{2}$

$x = 2 \pm \sqrt{2}$



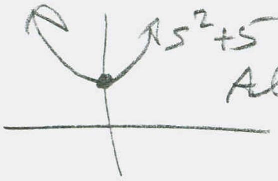
$\boxed{(2-\sqrt{2}, 2+\sqrt{2})}$

121 §3.1 II #s 72, 73, 78, 90, 92, 103

72 $-5-s^2 < 0$

$s^2+5 > 0$

$$\boxed{(-\infty,\infty)}$$



73 $a^2+20 \le 8a$

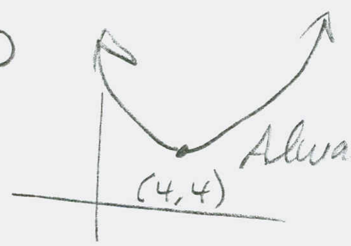
$a^2-8a+20 \le 0$

$a^2-8a+4^2-16+20 \le 0$

$(a-4)^2+4 \le 0$

Never!

$$\boxed{\emptyset}$$



#s 77-88 Solve each inequality. Give number line graph & interval notation soln.

78 $3x^2-4x-4 \le 0$

$3x^2-4x-4=0$

$x^2-\frac{4}{3}x-\frac{4}{3}=0$

$x^2-\frac{4}{3}x = \frac{4}{3}$

$x^2-\frac{4}{3}x+\left(\frac{2}{3}\right)^2 = \frac{4}{3}+\frac{4}{9}$

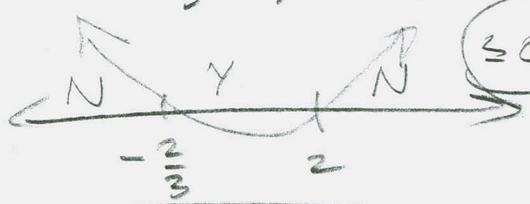
$\left(x-\frac{2}{3}\right)^2 = \frac{16}{9}$

$x-\frac{2}{3} = \pm\sqrt{\frac{16}{9}} = \pm\frac{4}{3}$

$x = \frac{2}{3} \pm \frac{4}{3}$

$x = \frac{6}{3} = 2, \ x = -\frac{2}{3}$

≤ 0



$\left(-\frac{2}{3}, 2\right)$

121 § 3.1 II #s 90, 92, 103

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

(a) $f(x)=0$:

$-x^2+2x+1=0$

$x^2-2x-1=0$

$x^2-2x \quad = 1$

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

$(x-1)^2=2$

$x-1=\pm\sqrt{2}$

$x=1\pm\sqrt{2}$

$\boxed{\{1-\sqrt{2},\ 1+\sqrt{2}\}}$

(b) $f(x)=-10$

$-x^2+2x+1=-10$

$x^2-2x-1 = 10$

$x^2-2x \quad = 11$

$x^2-2x+1^2 = 11+1$

$(x-1)^2=12$

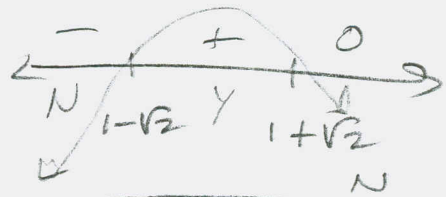
$x-1=\pm\sqrt{12} = \pm 2\sqrt{3}$

$x = 1\pm 2\sqrt{3}$

$\{1-2\sqrt{3},\ 1+2\sqrt{3}\}$

(c) $f(x)>0$

use (a) :



$\boxed{(1-\sqrt{2},\ 1+\sqrt{2})}$

(d) $f(x)\le 0$ use (c) :

$\boxed{(-\infty, 1-\sqrt{2}] \cup [1+\sqrt{2}, \infty)}$

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

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

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

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

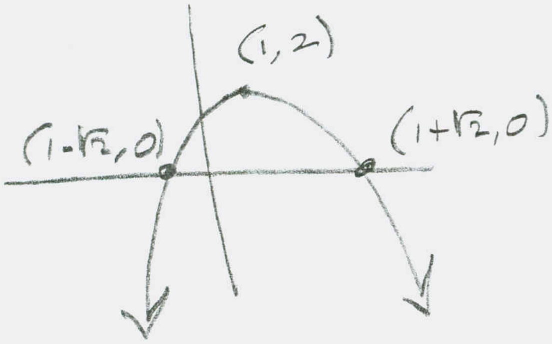
$f(x) = -(x-1)^2+2$

Reflect in x-axis.

Right 1, up 2

121 §3.1 II #s 90, 92, 103

(f)



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

$\mathcal{R} = (-\infty, 2]$

Max is $y = 2$ (@ $x=1$)

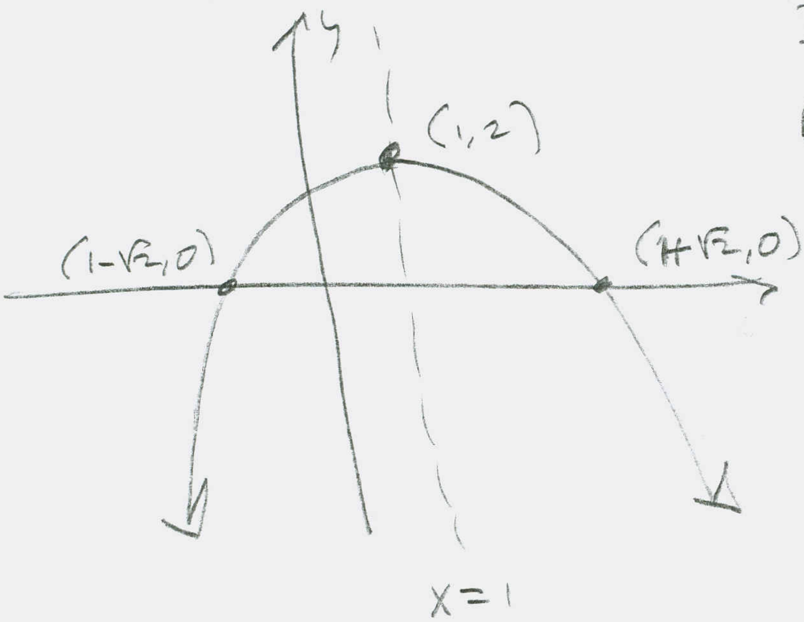
(g) The graph is above x-axis when $f(x) > 0$

" " " below " " $f(x) < 0$

(h) Intercepts, Axis of symmetry, vertex, opening, intervals of increase/decrease.

Inc: $(-\infty, 1]$

Dec: $[1, \infty)$



12.1 §3.1 II #s 90, 92, 103

90 $f(x) =$ [illegible]

(a) $f(x) = 0 \Longrightarrow$

$([illegible])([illegible]) = 0$

$x \in \{-2, 5\}$

(b) $f(x) = -10 \Longrightarrow$

$x^2 - 3x - 10 = -10$

$x^2 - 3x = 0$

$x^2 - 3x + \left(\frac{3}{2}\right)^2 - \frac{9}{4} = 0$

$\left(x - 3/2\right)^2 = \frac{9}{4}$

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

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

$x \in \{3, 0$

121 §3.1 II #s 92, 103

(92) Ball is tossed upward @ 64 $\frac{ft}{sec}$ from a height of 6 ft. Find max height

$h(t)$ = height (in feet) as a function of

t = time (in seconds)

$h(t) = \frac{1}{2}gt^2 + v_0 t + h_0$, where

$g = -32 \frac{ft}{s^2}$ = gravity

v_0 = initial velocity $= 64 \frac{ft}{s}$

h_0 = " height = 6 ft

$h(t) = -\frac{1}{2}(32)t^2 + 64t + 6$

$= -16t^2 + 64t + 6$

Max height is max of this parabola

$a = -16, b = 64, c = 6$

$-\frac{b}{2a} = -\frac{64}{-32} = 4$

$h(4) = -16(2)^2 + 64(2) + 6$

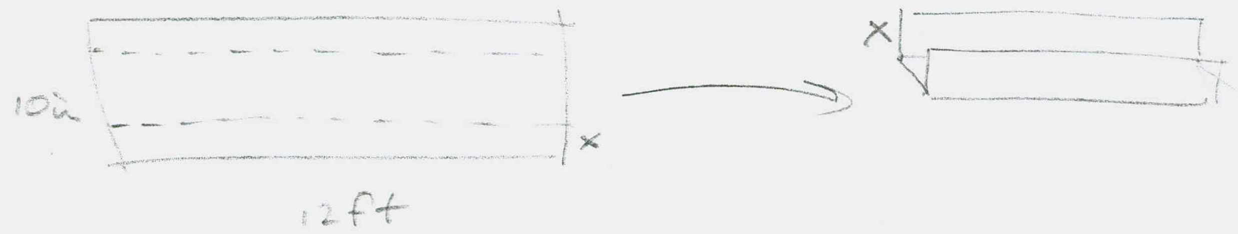
$= -16(4) + 128 + 6$

$= -64 + 128 + 6$

$= \boxed{70 \text{ ft}}$

121 §3.1 IV #s ~~..~~ 103

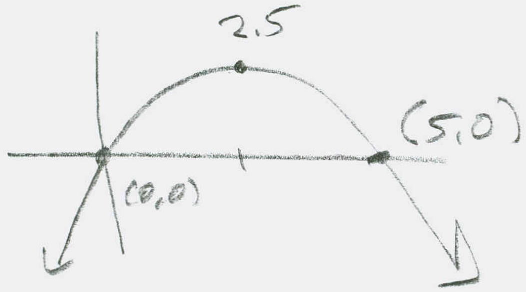
103 Aluminum sheet is 10 in x 12 ft, wants a gutter with max cross-section.



Look down it

cross-sectional area is $x(10-2x)$

$\Rightarrow$



$\boxed{x = 2.5 \text{ inches}}$, using the easy zeros of $x(10-2x)$ and symmetry of the parabola.