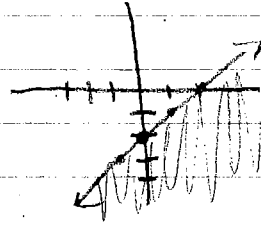


7.7 Systems of Inequalities and Linear Programming

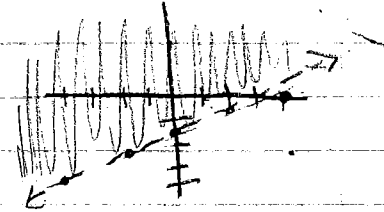
Open

Graph each inequality

(A) $x - y \geq 2$
 $-y \geq -x + 2$
 $y \leq x - 2$



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



$\frac{x - 3}{2} < y \approx y > \frac{x - 3}{2}$

Graphing a linear inequality

* solve for y (slope-intercept form)

* if you divide/mult. by a negative number, reverse the sign.

* $<$ $>$ \leftarrow \rightarrow

* \leq \geq \longleftrightarrow

* shading: $<$ or \leq shade below or left

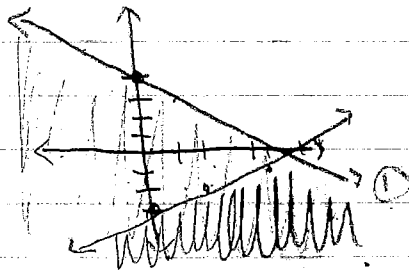
* $>$ or \geq shade above or right

Example 1: Graph the solution set of each

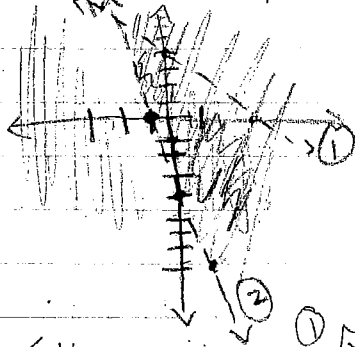
system of inequalities.

(A) ① $x + y \leq 4 \Rightarrow y \leq -x + 4$

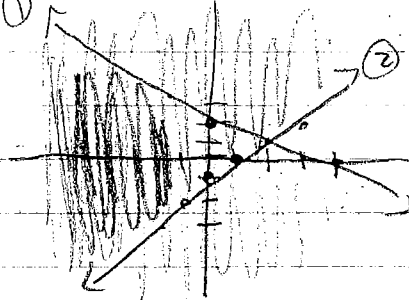
② $x - 2y \geq 6 \Rightarrow -2y \geq -x + 6 \Rightarrow y \leq \frac{x}{2} - 3$



①
 (B) ② $4x + 3y < 12 \Rightarrow 3y < 12 - 4x \Rightarrow y < 4 - \frac{4}{3}x \Rightarrow y < -\frac{4}{3}x + 4$
 $y + 4x > -4 \Rightarrow y > -4x - 4$

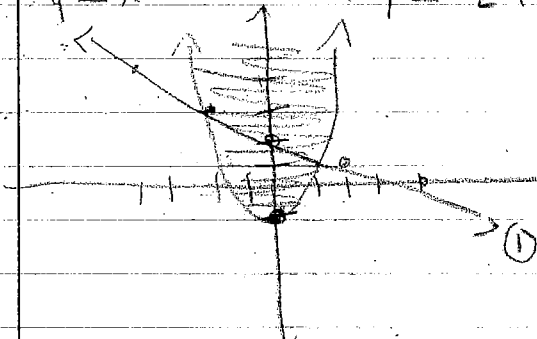


①
 (C) ① $x + 2y \leq 4$
 ② $y \geq x^2 - 1$
 ① $2y \leq 4 - x$
 $y \leq 2 - \frac{x}{2}$
 $y \leq -\frac{x}{2} + 2$



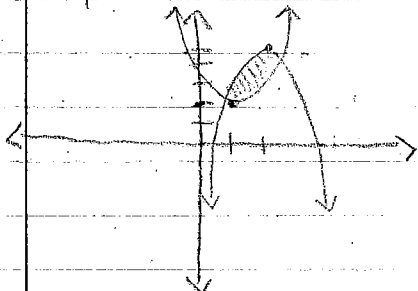
*

(D) ① $x + 2y \leq 4 \Rightarrow 2y \leq -x + 4$
 ② $y \geq x^2 - 1 \Rightarrow y \leq -\frac{x}{2} + 2$



$(0, 3)$
 $y \geq x^2 - 1$
 $3 \geq 0^2 - 1$
 $3 \geq -1$
 $(0, -3)$
 $-3 \geq -1$

(E) $y \geq (x-1)^2 + 2$
 $y \leq -(x-2) + 5$



$(1, 4) \quad 4 \geq (0)^2 + 2 \quad \checkmark$

$(2, 0) \quad 0 \leq -(0) + 5 \quad \checkmark$

7.7 Cont'd

Graphing a system of three ^{or more} inequalities

* graph the 3⁺ inequalities on the same axes

* shade the region common to all three.

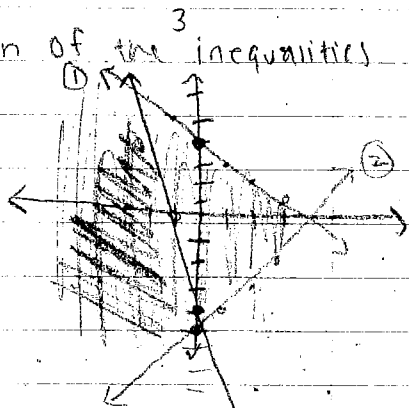
* \leq & \geq are solid

* $<$ & $>$ are dashed

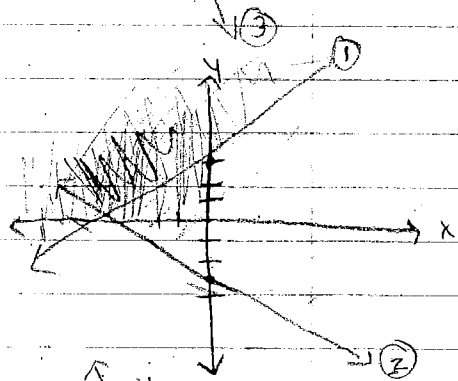
* Check points to see if they are true or false
 → if true that is where shading occurs.

Example 2: Graph each solution of the 3 inequalities

(A) $x + y \leq 4 \Rightarrow$ ① $y \leq -x + 4$
 $x - y \leq 5 \Rightarrow$ ② $y \geq x - 5$
 $4x + y \leq -4 \Rightarrow$ ③ $y \leq -4x - 4$



(B) $-2y + x \geq -5 \Rightarrow$ ① $2y \leq -x - 5$
 ② $y \leq 3 + x$ $=$ ① $y \geq -\frac{x}{2} - \frac{5}{2}$
 ③ $x \leq 0$
 ④ $y \leq 0$



(C) ① $x \geq 0$
 ② $x + y \leq 4 \Rightarrow y \leq -x + 4$
 ③ $2x + y \leq 5 \Rightarrow y \leq -2x + 5$

