5.1 Linear Inequalities

Linear Equation/Inequality: All vars have power of 1.

Ex Linear Inequalities:

$2x + 8y \geq 89$

$3x - 2y \geq 8$

$3x - 2y + 4z \leq 0$

Ex Non-Linear

$2x^3 \leq x^3 + y$

$x^2 + y^2 \leq 19z$

Solve Linear Inequalities

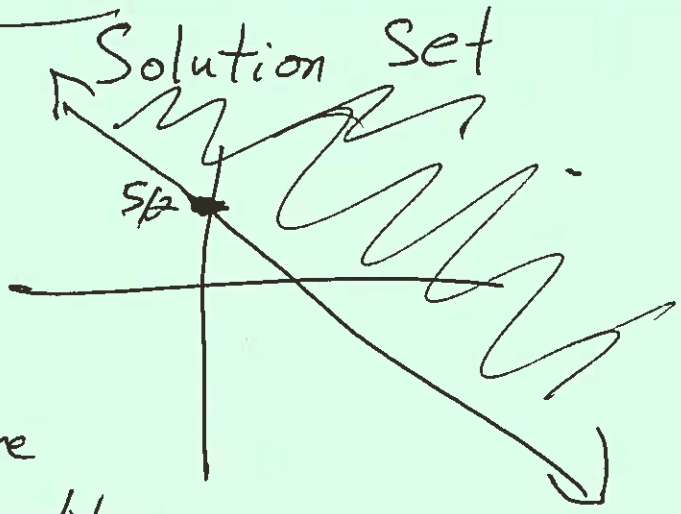
Ex $x + 2y \geq 5$

$2y \geq -x + 5$

$y \geq \frac{-1}{2}x + \frac{5}{2}$

Shade above line

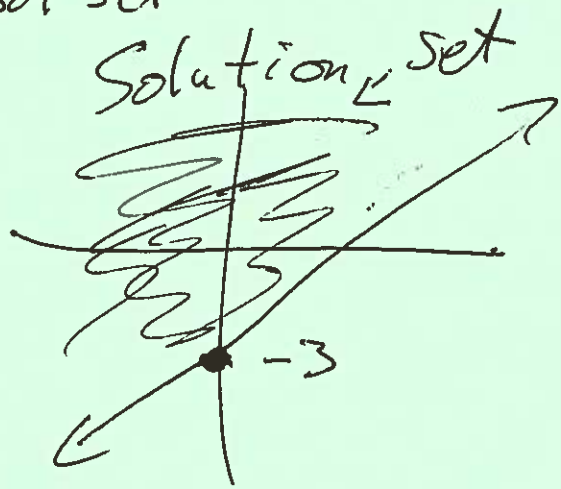
B/c of weak inequality, the line is part of sol set



Ex $3x - 2y \leq 6$

$3x - 6 \leq 2y$

$\frac{3}{2}x - 3 \leq y$ $\left(y \geq \frac{3}{2}x - 3\right)$



Ex $x \geq 3y$

$y \leq \frac{1}{3}x$

Shade below the line

Systems of Linear Ineq.

Ex $2x - 5y \leq 10$ ~~$(y \geq \frac{2}{5}x - 2)$~~

$x + 2y \leq 8$ ~~$(y \leq \frac{1}{2}x + 4)$~~

Any solution must satisfy both inequalities

$2x - 5y \leq 10$

$2x - 10 \leq 5y$

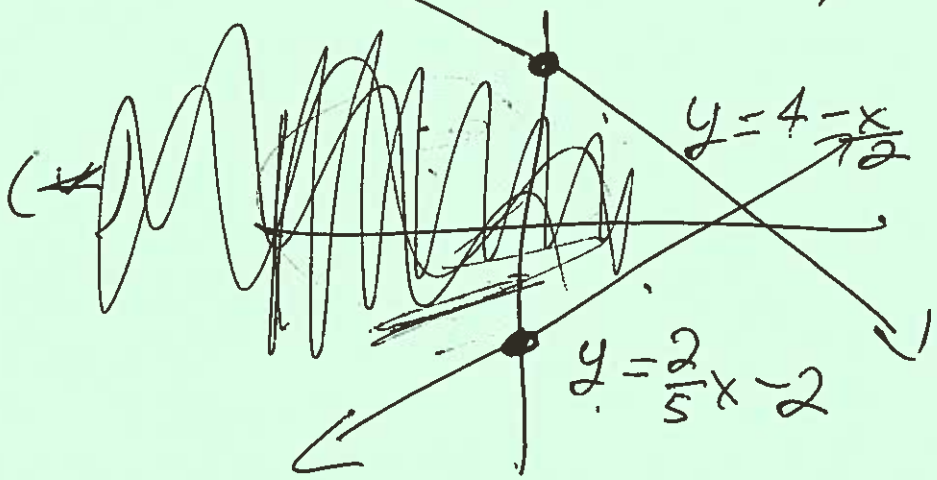
$y \geq \frac{2}{5}x - 2$ ~~$(\#)$~~

$x + 2y \leq 8$

~~$2x + 2y \leq 8$~~

$2y \leq 8 - x$

$y \leq 4 - \frac{x}{2}$ ~~$(\#)$~~



Ex $3x-2y \le 6$ $\left(y \ge \frac{3}{2}x-3\right)$

$x+y \ge -5$ $\left(y \ge -x-5\right)$

$y \le 4$

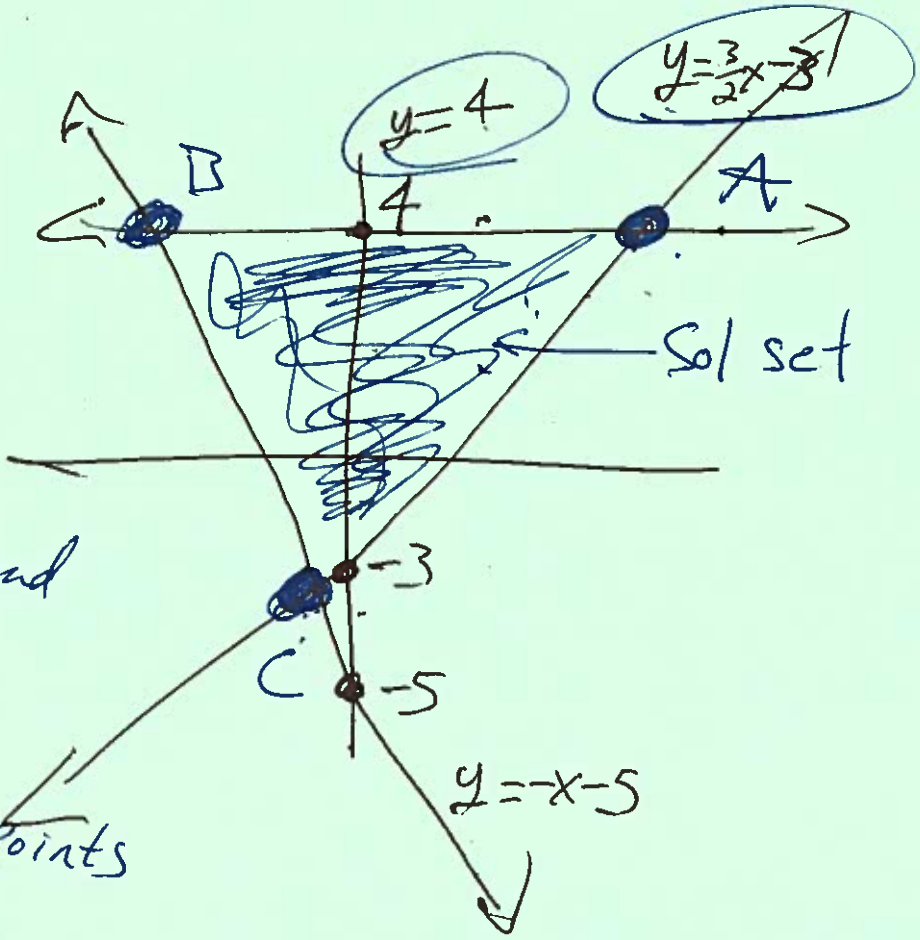
$3x-2y \le 6$

$3x-6 \le 2y$

$y \ge \frac{3}{2}x-3$

a) Graph System and ID sol set

b) Determine corner points (Big blue points)



Lines

$y=4$

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

$y=-x-5$

Point A Set $\frac{3}{2}x-3=4$

$A=\left(\frac{14}{3},4\right)$

$\frac{3}{2}x=7$

$x=\frac{2}{3}(7)=\frac{14}{3}$

Point C $\left(\frac{-4}{5},\frac{-21}{5}\right)$

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

$\frac{5}{2}x=-2$

$x=\frac{-4}{5}$

$y=\frac{3}{2}\left(\frac{-4}{5}\right)-3$

$y=\frac{-21}{5}$

Point B $(-9,4)$

$-x-5=4$

$-x=9$

$x=-9$