12/5/22 A6 206B

Q1

$4x - y = 2$

$x + 2y = 5$

a) Solve for x, y

$x + 2y = 5$

$-2y \quad -2y$

$x = 5 - 2y$

$4(5 - 2y) - y = 2$

$20 - 8y - y = 2$

$-9y = -18$

$y = 2$

$x = 1$

$y = 2$

$4x - 2 = 2$

$+2 = +2$

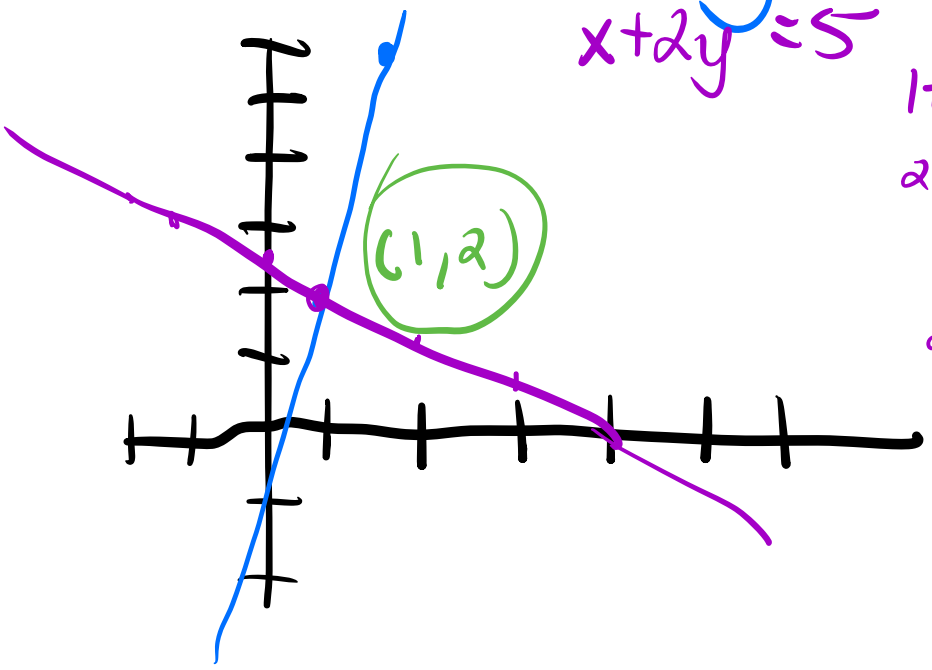
$4x = 4$

$x = 1$

b) Plot

$4x-y=2$

$x+2y=5$



$4-y=2$

$-y=2-4$

$y=2$

$1+2y=5$

$2y=4$

$y=2$

$8-y=2$

$-y=-6$

$y=6$

$2+2y=5$

$2y=3$

$y=1.5$

Q2

$2x-y=3$

$2x+2y=6$

a) Solve for x and y

$x=2$

$y=1$

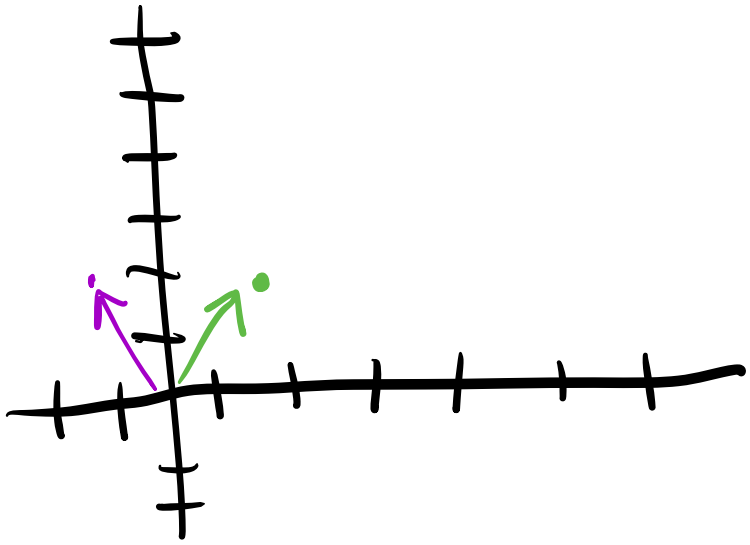
$$\begin{pmatrix} 2 & -1 \\ 2 & 2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}=\begin{pmatrix} 3 \\ 6 \end{pmatrix}$$

$$m^{-1}=\frac{1}{6}\begin{pmatrix} 2 & 1 \\ -2 & 2 \end{pmatrix}=\begin{pmatrix} .33 & .175 \\ -.33 & .33 \end{pmatrix}\begin{pmatrix} 2 & -1 \\ 2 & 2 \end{pmatrix}\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

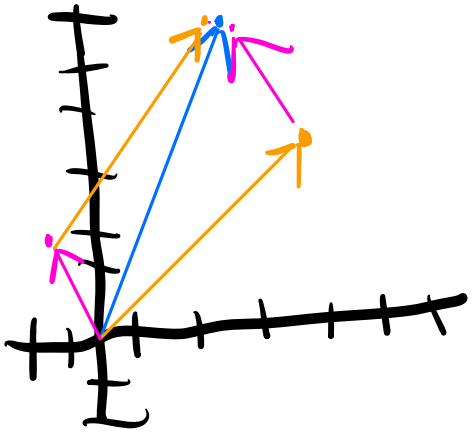
$$\begin{pmatrix} .33 & .175 \\ -.33 & .33 \end{pmatrix}\left(\begin{pmatrix} 3 \\ 6 \end{pmatrix} - \begin{pmatrix} 2 \\ 1 \end{pmatrix}\right) = \begin{matrix} x \\ y \end{matrix}$$

b) $\begin{pmatrix} 2 \\ 2 \end{pmatrix} x + \begin{pmatrix} -1 \\ 2 \end{pmatrix} y = \begin{pmatrix} 3 \\ 6 \end{pmatrix}$

c) Draw as vectors.



d) Draw as scaled vectors



$x=2$
$y=1$

$\begin{pmatrix} 4 \\ 4 \end{pmatrix}$ $\begin{pmatrix} -1 \\ 2 \end{pmatrix}$ $\begin{pmatrix} 3 \\ 6 \end{pmatrix}$

(The drawing isn't perfect but the math checks out :))

Q3

$A = \begin{pmatrix} 4 \\ -1 \end{pmatrix}$ $B = \begin{pmatrix} -2 & 3 \end{pmatrix}$

$C = \begin{pmatrix} -1 & 2 \\ -3 & 1 \end{pmatrix}$ $D = \begin{pmatrix} 2 & 0 \\ 1 & -1 \\ -1 & 3 \end{pmatrix}$

a) $2A$ $2\begin{pmatrix} 4 \\ -1 \end{pmatrix} = \begin{pmatrix} 8 \\ -2 \end{pmatrix}$

b) $A + B$

Not possible, Ms need same dimensions for addition

c) BA $\begin{pmatrix} -2 & 3 \end{pmatrix}\begin{pmatrix} 4 \\ -1 \end{pmatrix} = (-11)$

d) AB $\begin{pmatrix} 4 \\ -1 \end{pmatrix}\begin{pmatrix} -2 & 3 \end{pmatrix}$

Not possible. # of columns in m^1 must equal # of rows in m^2

e) $CA \begin{pmatrix} -1 & 2 \\ -3 & 1 \end{pmatrix} \begin{pmatrix} 4 \\ -1 \end{pmatrix} = \begin{pmatrix} -6 \\ -13 \end{pmatrix}$

f) DC

Not possible. C doesn't have enough rows. See d).

g) $B^T B \begin{pmatrix} -2 \\ 3 \end{pmatrix} (-2\ 3)$

Not possible. See d). BB^T could work.

h) $C^{-1} \begin{pmatrix} -1 & 2 \\ -3 & 1 \end{pmatrix}$

$\frac{1}{5} \begin{pmatrix} 1 & -2 \\ 3 & -1 \end{pmatrix} = \begin{pmatrix} 1/5 & -2/5 \\ 3/5 & -1/5 \end{pmatrix} \begin{pmatrix} -1 & 2 \\ -3 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$