A6 – Corrin Morgan

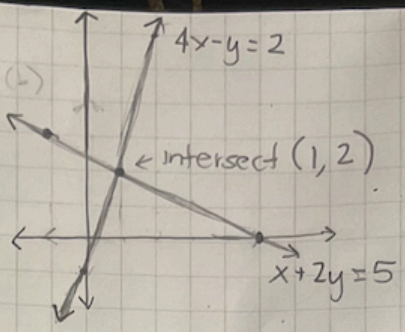
Q1. $4x-y=2$ and $x+2y=5$

$y=4x-2 \rightarrow x+2(4x-2)=5$

$x+8x-4=5$

$9x=9 \rightarrow \boxed{x=1}$

$\rightarrow 4(1)-y=2 \rightarrow \boxed{y=2}$



Q2 $2x-y=3 \rightarrow y=-3+2x$

$2x+2y=6$

$2x+2(-3+2x)=6$

$2x-6+4x=6$

$6x=12$

$\boxed{x=2}$

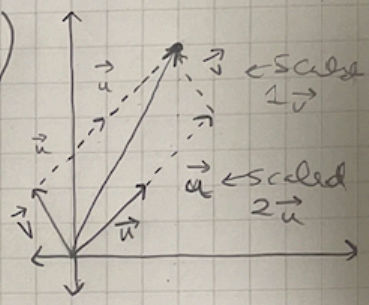
$\rightarrow 2(2)-y=3 \rightarrow \boxed{y=1}$

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

$\vec{u}\quad\vec{v}$

$2\vec{u}+\vec{v}=\begin{pmatrix}3\\6\end{pmatrix}$

$x\quad y$



Q3 $A=\begin{bmatrix}4\\1\end{bmatrix}$ $B=\begin{bmatrix}-2 & 3\end{bmatrix}$ $C=\begin{bmatrix}-1 & 2\\-3 & 1\end{bmatrix}$ $D=\begin{bmatrix}2 & 0\\1 & -1\\-1 & 3\end{bmatrix}$

(a) $A+B \rightarrow$ cannot calculate (different dimensions can't be added together)

(b) $2A \rightarrow 2\begin{bmatrix}4\\1\end{bmatrix}=\begin{bmatrix}2\times4\\2\times1\end{bmatrix}=\begin{bmatrix}8\\2\end{bmatrix}$ answer $=\begin{bmatrix}8\\2\end{bmatrix}$

(c) $B\times A \rightarrow \begin{bmatrix}-2 & 3\end{bmatrix}\times\begin{bmatrix}4\\1\end{bmatrix}=[(-2\times4)+(3\times1)]=[-5]$ answer $=[-5]$

$1\times2 \quad 2\times1$ (match; solution dim.)

(d) $A\times B \rightarrow \begin{bmatrix}4\\1\end{bmatrix}\times\begin{bmatrix}-2 & 3\end{bmatrix}=\begin{bmatrix}4\times-2 & 4\times3\\1\times-2 & 1\times3\end{bmatrix}=\begin{bmatrix}-8 & 12\\-2 & 3\end{bmatrix}$ answer $=\begin{bmatrix}-8 & 12\\-2 & 3\end{bmatrix}$

$2\times1 \quad 1\times2$

(e) $CA \rightarrow \begin{bmatrix}-1 & 2\\-3 & 1\end{bmatrix}\times\begin{bmatrix}4\\1\end{bmatrix}=\begin{bmatrix}\begin{pmatrix}-1\\\times4\end{pmatrix}+\begin{pmatrix}2\\\times-1\end{pmatrix}\\\begin{pmatrix}-3\\\times4\end{pmatrix}+\begin{pmatrix}1\\\times-1\end{pmatrix}\end{bmatrix}=\begin{bmatrix}-4-2\\-12-1\end{bmatrix}=\begin{bmatrix}-6\\-13\end{bmatrix}$ answer $=\begin{bmatrix}-6\\-13\end{bmatrix}$

$2\times2 \quad 2\times1$

(f) $DC \rightarrow \begin{bmatrix}2 & 0\\1 & -1\\-1 & 3\end{bmatrix}\times\begin{bmatrix}-1 & 2\\-3 & 1\end{bmatrix}=\begin{bmatrix}(2\times-1)+(0\times-3) & (2\times2)+(0\times1)\\(1\times-1)+(-1\times-3) & (1\times2)+(-1\times1)\\(-1\times-1)+(3\times-3) & (-1\times2)+(3\times1)\end{bmatrix}=\begin{bmatrix}-2+0 & 4+0\\-1+3 & 2-1\\1+-9 & -2+3\end{bmatrix}=\begin{bmatrix}-2 & 4\\2 & 1\\-8 & 1\end{bmatrix}$ answer $=\begin{bmatrix}-2 & 4\\2 & 1\\-8 & 1\end{bmatrix}$

$3\times2 \quad 2\times2$

(g) $B^TB \rightarrow \begin{bmatrix}-2\\3\end{bmatrix}\times\begin{bmatrix}-2 & 3\end{bmatrix}=\begin{bmatrix}-2\times-2 & -2\times3\\3\times-2 & 3\times3\end{bmatrix}=\begin{bmatrix}4 & -6\\-6 & 9\end{bmatrix}$ answer $=\begin{bmatrix}4 & -6\\-6 & 9\end{bmatrix}$

$2\times1 \quad 1\times2$

(h) $C^{-1} \rightarrow \begin{bmatrix}-1 & 2\\-3 & 1\end{bmatrix}^{-1}=\frac{1}{\det(C)}\cdot\begin{bmatrix}1 & -2\\-(-3) & -1\end{bmatrix}=\frac{1}{5}\begin{bmatrix}1 & -2\\3 & -1\end{bmatrix}=\begin{bmatrix}\frac{1}{5} & -\frac{2}{5}\\\frac{3}{5} & -\frac{1}{5}\end{bmatrix}$ answer $=\begin{bmatrix}1/5 & -2/5\\3/5 & -1/5\end{bmatrix}$

$\det(C)=(-1\times1)-(-3\times2)$

$=-1+6$

$=5$