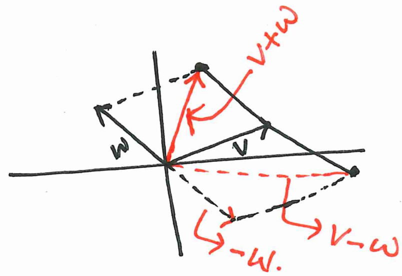
Assignment # 1.

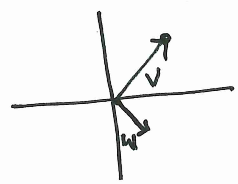
Sec 1.1.

1 (a) line (b) plane (c) all of $\mathbb{R}^3$.

2.



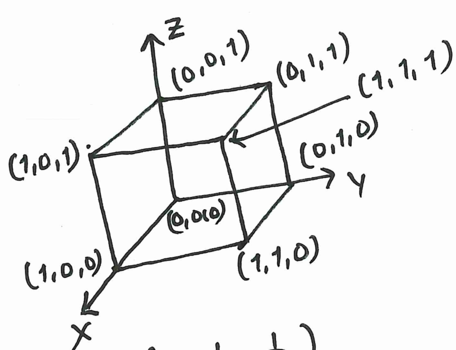
(3) $v = \begin{bmatrix} 3 \\ 3 \end{bmatrix}$ $w = \begin{bmatrix} 2 \\ -2 \end{bmatrix}$



(5) $u+v+w = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$ $2u+2v+w = \begin{bmatrix} -2 \\ 3 \\ 1 \end{bmatrix}$

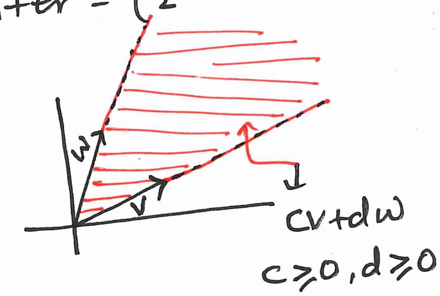
Since $u+v+w=0 \Rightarrow u=-v-w$.
i.e. u lies on the plane determined by v and w, so u, v, w lie on a plane

(11)



center = $\left(\frac{1}{2}, \frac{1}{2}, \frac{1}{2}\right)$

(19)



Sec 1.2.

(1) $u \cdot v = 0$, $u \cdot w = 1$, $u \cdot (v+w) = 1$
$w \cdot v = 10$

(2) $\|u\| = 1$, $\|v\| = 5$ $\|w\| = \sqrt{5}$

$\boxed{|u \cdot v| = 0 \quad \|u\|\,\|v\| = 5}$ $0 < 5$ ✓

$\boxed{|v \cdot w| = 10 \quad \|v\|\,\|w\| = 5\sqrt{5}}$ $10 < 5\sqrt{5}$. ✓

(6) (a) $w = (w_1, w_2)$ such that $w_2 = 2w_1$.

(b) plane

(c) line

(7) (a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{3\pi}{4}$

(13) $v = (-1, 0, 1)$; $w = (0, 1, 0)$

(14) $u = (-1, -1, 1, 1)$, $v = (0, 0, -1, 1)$
$w = (1, -1, 0, 0)$

(29) $2 \leq \|v-w\| \leq 8$

$-15 \leq v \cdot w \leq 15$

(31) $\frac{2\pi}{3}$, because $\frac{v \cdot w}{\|v\|\,\|w\|} = \cos\theta$

$= \cos\frac{2\pi}{3} = -\frac{1}{2}$