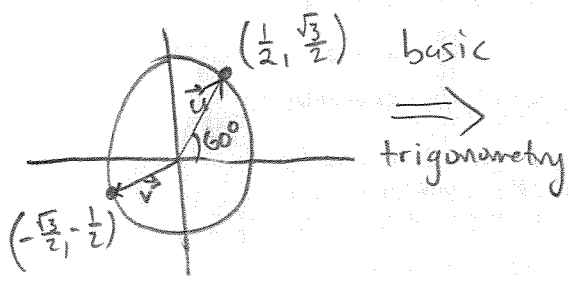


§1.1 #12

$$\begin{aligned}
 3\vec{b} - 2\vec{c} + \vec{d} &= 3 \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix} - 2 \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix} + \begin{bmatrix} -1 \\ -1 \\ -2 \end{bmatrix} \\
 &= \begin{bmatrix} 9 \\ 6 \\ 3 \end{bmatrix} + \begin{bmatrix} -2 \\ 4 \\ -2 \end{bmatrix} + \begin{bmatrix} -1 \\ -1 \\ -2 \end{bmatrix} \\
 &= \begin{bmatrix} 6 \\ 9 \\ -1 \end{bmatrix}
 \end{aligned}$$

#13



$$\vec{u} = \begin{bmatrix} 1/2 \\ \sqrt{3}/2 \end{bmatrix}$$

$$\vec{v} = \begin{bmatrix} -\sqrt{3}/2 \\ -1/2 \end{bmatrix}$$

$$\vec{u} + \vec{v} = \begin{bmatrix} 1/2 \\ \sqrt{3}/2 \end{bmatrix} + \begin{bmatrix} -\sqrt{3}/2 \\ -1/2 \end{bmatrix} = \begin{bmatrix} \frac{1-\sqrt{3}}{2} \\ \frac{\sqrt{3}-1}{2} \end{bmatrix}$$

$$\vec{u} - \vec{v} = \begin{bmatrix} 1/2 \\ \sqrt{3}/2 \end{bmatrix} - \begin{bmatrix} -\sqrt{3}/2 \\ -1/2 \end{bmatrix} = \begin{bmatrix} \frac{1+\sqrt{3}}{2} \\ \frac{\sqrt{3}+1}{2} \end{bmatrix}$$

#18

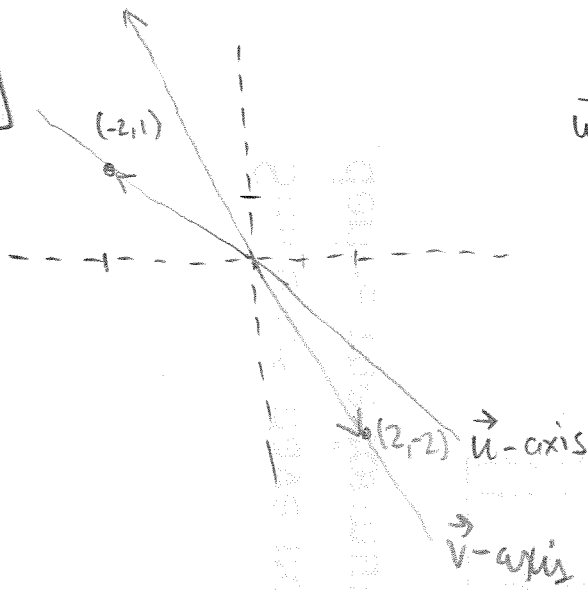
$$\vec{x} + 2\vec{a} - \vec{b} = 3(\vec{x} + \vec{a}) - 2(2\vec{a} - \vec{b})$$

$$\vec{x} + 2\vec{a} - \vec{b} = 3\vec{x} + \underbrace{3\vec{a} - 4\vec{a}}_{=-\vec{a}} + 2\vec{b}$$

$$3\vec{a} - 3\vec{b} = 2\vec{x}$$

$$\frac{3}{2}\vec{a} - \frac{3}{2}\vec{b} = \vec{x}$$

#20



$$\begin{aligned} \vec{w} &= -\vec{u} - 2\vec{v} \\ &= -\begin{bmatrix} -2 \\ 1 \end{bmatrix} - 2\begin{bmatrix} 2 \\ -2 \end{bmatrix} \\ &= \begin{bmatrix} 2 \\ -1 \end{bmatrix} + \begin{bmatrix} -4 \\ 4 \end{bmatrix} \\ &= \begin{bmatrix} -2 \\ 3 \end{bmatrix} \end{aligned}$$

Section 2.1

#13 | $x + 2y + 3z = 4$

Solution set: solve for a variable, say x , to get

$$x = 4 - 2y - 3z \leftarrow \text{only condition on a solution vector needed to guarantee a solution}$$

So solutions are

$$\vec{x} = \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 - 2y - 3z \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} -2 \\ 1 \\ 0 \end{bmatrix} y + \begin{bmatrix} -3 \\ 0 \\ 1 \end{bmatrix} z,$$

for any $y, z \in \mathbb{R}$

#27

$$\left[\begin{array}{cc|c} 1 & -1 & 0 \\ 2 & 1 & 3 \end{array} \right]$$

#28

$$\left[\begin{array}{ccc|c} 2 & 3 & -1 & 1 \\ 1 & 0 & 1 & 0 \\ -1 & 2 & -2 & 0 \end{array} \right]$$

#31

$$\begin{cases} y + z = 1 \\ x - y = 1 \\ 2x - y + z = 1 \end{cases}$$

#32

$$\begin{cases} x_1 - x_2 + 3x_4 + x_5 = 2 \\ x_1 + x_2 + 2x_3 + x_4 - x_5 = 4 \\ x_2 + 2x_4 + 3x_5 = 0 \end{cases}$$