

1. 
$$\begin{bmatrix} 3 & 4 & -2 \\ 1 & 2 & -1 \end{bmatrix} * \begin{bmatrix} -2 & 4 \\ -3 & 4 \\ -5 & 1 \end{bmatrix} =$$

2. Solve: 
$$\begin{cases} x + y - z = 3 \\ 2x - y - z = 1 \\ x + y - 2z = 5 \end{cases}$$

3. Solve: 
$$\begin{cases} x + y + z = 6 \\ -x + 2y - z = 3 \\ -x + 3y = 0 \end{cases}$$

4. Find the Determinant: 
$$\begin{bmatrix} 8 & -7 & 10 \\ 2 & 3 & 8 \\ -4 & 5 & -2 \end{bmatrix}$$

5. Find the Determinant: 
$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 0 \\ 3 & 0 & 2 \end{bmatrix}$$

6. Find the angle in degrees between  $8\mathbf{i} - 3\mathbf{j}$  and  $2\mathbf{i} - 7\mathbf{j}$ .

7. Find the Work done by pulling a wagon, with a Force of 12 pounds and direction of  $50^\circ$  above horizontal, 112 feet along the ground.

8. Solve:  $x^2 + 8 + 8\sqrt{3}i = 0$

9. Given:  $\vec{u} = \langle 2, 6 \rangle$  and  $\vec{v} = \langle -2, 3 \rangle$ . Find  $\text{proj}_{\vec{v}} \vec{u}$

10. A plane flying at a velocity of 586 mph with a direction of  $52^\circ$  encounters a wind with a velocity of 33 mph and a direction of  $153^\circ$ . What will the new velocity and direction of the plane be?

1. 
$$\begin{bmatrix} 3 & 4 & -2 \\ 1 & 2 & -1 \end{bmatrix} * \begin{bmatrix} -2 & 4 \\ -3 & 4 \\ -5 & 1 \end{bmatrix} =$$

$$\begin{bmatrix} -8 & 26 \\ -3 & 11 \end{bmatrix}$$

2. Solve: 
$$\begin{cases} x + y - z = 3 \\ 2x - y - z = 1 \\ x + y - 2z = 5 \end{cases}$$

$$\begin{bmatrix} 1 & 1 & -1 & 3 \\ 2 & -1 & -1 & 1 \\ 1 & 1 & -2 & 5 \end{bmatrix} \rightarrow \begin{bmatrix} 3 & 0 & -2 & 4 \\ 2 & -1 & -1 & 1 \\ 3 & 0 & -3 & 6 \end{bmatrix} \rightarrow \begin{bmatrix} 3 & 0 & -2 & 4 \\ 2 & -1 & -1 & 1 \\ 1 & 0 & -1 & 2 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & -1 & 0 & -1 \\ 1 & 0 & -1 & 2 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & -2 \end{bmatrix}$$

$(0, 1, -2)$

3. Solve: 
$$\begin{cases} x + y + z = 6 \\ -x + 2y - z = 3 \\ -x + 3y = 0 \end{cases}$$

$$\begin{bmatrix} 1 & 1 & 1 & 6 \\ -1 & 2 & -1 & 3 \\ -1 & 3 & 0 & 0 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 1 & 1 & 6 \\ 0 & 3 & 0 & 9 \\ 0 & 4 & 1 & 6 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 1 & 1 & 6 \\ 0 & 1 & 0 & 3 \\ 0 & 4 & 1 & 6 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 2 \end{bmatrix} \rightarrow (9, 3, -6)$$

4. Find the Determinant: 
$$\begin{bmatrix} 8 & -7 & 10 \\ 2 & 3 & 8 \\ -4 & 5 & -2 \end{bmatrix}$$

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5. Find the Determinant: 
$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 0 \\ 3 & 0 & 2 \end{bmatrix}$$

$$-7$$

6. Find the angle in degrees between  $8\mathbf{i} - 3\mathbf{j}$  and  $2\mathbf{i} - 7\mathbf{j}$ .

$$53.4985588795^\circ = \boxed{53.499^\circ}$$

7. Find the Work done by pulling a wagon, with a Force of 12 pounds and direction of  $50^\circ$  above horizontal, 112 feet along the ground.

$$12 \cos 50^\circ (112) = \boxed{863.907 \text{ foot-pounds}}$$

8. Solve:  $x^2 + 8 + 8\sqrt{3} \mathbf{i} = 0$

$$x^2 = -8 - 8\sqrt{3} \mathbf{i} \rightarrow r = \sqrt{8^2 + 8^2(3)} = 16 \rightarrow \theta = \arctan \sqrt{3} = \frac{4\pi}{3}$$

$$\left(16 \operatorname{cis} \frac{4\pi}{3}\right)^{1/2}$$

$$4 \operatorname{cis} \frac{2\pi}{3}$$

$$4\left(-\frac{1}{2} + \frac{\sqrt{3}}{2} \mathbf{i}\right)$$

$$\boxed{-2 + 2\sqrt{3} \mathbf{i}}$$

$$\left(16 \operatorname{cis} \frac{10\pi}{3}\right)^{1/2}$$

$$4 \operatorname{cis} \frac{5\pi}{3}$$

$$4\left(\frac{1}{2} - \frac{\sqrt{3}}{2} \mathbf{i}\right)$$

$$\boxed{2 - 2\sqrt{3} \mathbf{i}}$$

9. Given:  $\vec{u} = \langle 2, 6 \rangle$  and  $\vec{v} = \langle -2, 3 \rangle$ . Find  $\operatorname{proj}_{\vec{v}} \vec{u}$

$$\frac{-4 + 18}{13} \langle -2, 3 \rangle = \frac{14}{13} \langle -2, 3 \rangle = \boxed{\left\langle \frac{-28}{13}, \frac{42}{13} \right\rangle} \text{ or } \boxed{\langle -2.154, 3.231 \rangle}$$

10. A plane flying at a velocity of 586 mph with a direction of  $52^\circ$  encounters a wind with a velocity of 33 mph and a direction of  $153^\circ$ . What will the new velocity and direction of the plane be?

$$\vec{p} = \langle 586 \cos 33^\circ, 586 \sin 33^\circ \rangle \approx \langle 360.778, 461.774 \rangle$$

$$\vec{w} = \langle 33 \cos 153^\circ, 33 \sin 153^\circ \rangle \approx \langle -29.403, 14.982 \rangle$$

$$\vec{p} + \vec{w} = \langle 331.374, 476.756 \rangle = \langle x, y \rangle$$

$$\text{Velocity} = \sqrt{x^2 + y^2} = \boxed{580.608 \text{ mph}}$$

$$\text{Direction} = \arctan \frac{y}{x} = \boxed{55.198^\circ}$$