

$$1) \quad u = \begin{pmatrix} 1 \\ -1 \\ 0 \end{pmatrix} \quad v = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}$$

$$|u| = \sqrt{(1)^2 + (-1)^2 + 0^2} \quad |v| = \sqrt{(1)^2 + (2)^2 + (0)^2}$$

$$|u| = \sqrt{2} \quad |v| = \sqrt{5}$$

$$u \times v = \begin{pmatrix} (-1)(0) - (0)(2) \\ (0)(1) - (1)(0) \\ (1)(2) - (-1)(1) \end{pmatrix}$$

$$u \times v = (0, 0, 3)$$

$$|u \times v| = \sqrt{0^2 + 0^2 + 3^2} = 3$$

$$u \times v = |u| \cdot |v| \cdot \cos \theta$$

$$u \times v = (1) \cdot (1) + (-1) \cdot (2) + (0)(0)$$

$$u \times v = -1$$

$$-1 = \sqrt{2} \cdot \sqrt{5} \cdot \cos \theta$$

$$\frac{-1}{\sqrt{10}} = \cos \theta$$

$$\sin \theta = \sqrt{1 - \cos^2 \theta}$$

$$\sin \theta = \sqrt{1 - \left(\frac{-1}{\sqrt{10}}\right)^2}$$

$$\sin \theta = \frac{3}{\sqrt{10}}$$

$$u \times v = \begin{pmatrix} u_2 v_3 - u_3 v_2 \\ u_3 v_1 - u_1 v_3 \\ u_1 v_2 - u_2 v_1 \end{pmatrix}$$

$$u \times v = |u| \cdot |v| \cdot \cos \theta$$

$$|u \times v| =$$
~~$$|u| \cdot |v| \cdot \cos \theta$$~~

$$|u| \cdot |v| \cdot \sin \theta$$

$$\sin \theta = \sqrt{1 - \cos^2 \theta}$$

$$|u \times v| =$$
~~$$|u| \cdot |v| \cdot \cos \theta$$~~

$$|u| \cdot |v| \cdot \sin \theta$$

$$|u \times v| =$$
~~$$\sqrt{2} \cdot \sqrt{5} \cdot \cos \theta$$~~

$$\sqrt{2} \cdot \sqrt{5} \cdot \sin \theta$$

$$|u \times v| = \sqrt{2} \cdot \sqrt{5} \cdot \frac{3}{\sqrt{10}}$$

$$|u \times v| = 3$$