

3. $v = i + j$ $w = i - j$

a) $v \cdot w = 1(1) + 1(-1)$
 $= 1 - 1$
 $= \textcircled{0}$

b) $\cos \theta = \frac{v \cdot w}{\|v\| \|w\|}$

$$\cos \theta = \frac{0}{\sqrt{1^2+1^2} \sqrt{1^2+(-1)^2}}$$

$$\cos \theta = \frac{0}{\sqrt{2} \sqrt{2}}$$

$$\cos \theta = \frac{0}{\sqrt{4}}$$

$$\cos \theta = \frac{0}{2}$$

$$\cos \theta = 0$$

$$\theta = \cos^{-1}(0)$$

$$\theta = \textcircled{90^\circ}$$

c) $\textcircled{\text{ORTHOGONAL}}$



4. $v = 2i + 3j$ $w = 8i + 12j$

a) $v \cdot w = 2(8) + 3(12)$
 $= 16 + 36$
 $= \textcircled{52}$

b) $\cos \theta = \frac{v \cdot w}{\|v\| \|w\|}$

$$\cos \theta = \frac{52}{\sqrt{2^2+3^2} \sqrt{8^2+12^2}}$$

$$\cos \theta = \frac{52}{\sqrt{13} \sqrt{64+144}}$$

$$\cos \theta = \frac{52}{\sqrt{13} \cdot \sqrt{208}}$$

$$\theta = \cos^{-1} \left(\frac{52}{(\sqrt{13} \cdot \sqrt{208})} \right)$$

$$\theta = \textcircled{0^\circ}$$

c) $\textcircled{\text{PARALLEL}}$