

Math 114 Quiz 0

Tue, 5/24

Name :

1. Find a number a so that the vectors \mathbf{v} and \mathbf{w} are orthogonal (perpendicular).

$$\mathbf{v} = 2\hat{i} + 4a\hat{j} + 6\hat{k}, \quad \mathbf{w} = \hat{i} + 3\hat{j} - 7\hat{k}$$

Solution: Since \vec{v} and \vec{w} are orthogonal, $\vec{v} \cdot \vec{w} = 0$

$$0 = \vec{v} \cdot \vec{w} = (2\hat{i} + 4a\hat{j} + 6\hat{k}) \cdot (\hat{i} + 3\hat{j} - 7\hat{k})$$

$$= (2 \times 1) + (4a \times 3) + (6 \times (-7))$$

$$= 2 + 12a - 42$$

$$= 12a - 40$$

Therefore $12a = 40$

$$\text{so } a = \frac{40}{12} = \boxed{\frac{10}{3}}$$