

Special Problem 2-4.5

Vectors $\hat{a}, \hat{b}, \hat{c}$ form an **orthonormal** set of vectors.

Vectors $\hat{i}, \hat{j}, \hat{k}$ **also** form an orthonormal set of vectors.

The following is known about these vectors:

$$\hat{i} = \frac{1}{5\sqrt{2}}(3\hat{a} + 4\hat{b} + 5\hat{c})$$

$$\hat{j} = \frac{1}{5\sqrt{3}}(7\hat{a} + \hat{b} - 5\hat{c})$$

$$\hat{a} \cdot \hat{k} = \frac{1}{\sqrt{6}}$$

$$\hat{k} \cdot \hat{b} = \frac{-2}{\sqrt{6}}$$

$$\hat{c} \cdot \hat{k} = \frac{1}{\sqrt{6}}$$

Vector **A** can be written using the **first** set of orthonormal base vectors as:

$$\mathbf{A} = \sqrt{6} \hat{a} - 2\sqrt{6} \hat{b}$$

The **same vector** of course can be written in terms of the **second** set of orthonormal base vectors as:

$$\mathbf{A} = A_i \hat{i} + A_j \hat{j} + A_k \hat{k}$$

Determine the value of scalar components A_i , A_j and A_k .