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:

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

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

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

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

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

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.