PROBLEM 9.9, NO. 2
Greenberg's Book

Given:

$$u = \begin{bmatrix} 9 \\ -2 \\ 4 \end{bmatrix}$$

$$e_1 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}, e_2 = \begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}, e_3 = \begin{bmatrix} 6 \\ 3 \\ -5 \end{bmatrix}$$

$$v_1 = \frac{DotProduct(u, e_1)}{DotProduct(e_1, e_1)}$$

$$v_1 = 2$$

$$v_2 = \frac{DotProduct(u, e_2)}{DotProduct(e_2, e_2)}$$

$$v_2 = \frac{13}{5}$$

$$v_3 = \frac{DotProduct(u, e_3)}{DotProduct(e_3, e_3)}$$

$$v_3 = \frac{2}{5}$$

$$u = 2\, e_1 + \frac{13\, e_2}{5} + \frac{2\, e_3}{5}$$

Given:

$$u = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$

$$e_1 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}, e_2 = \begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}, e_3 = \begin{bmatrix} 6 \\ 3 \\ -5 \end{bmatrix}$$

$$v_1 = \frac{DotProduct(u, e_1)}{DotProduct(e_1, e_1)}$$

$$v_1 = \frac{1}{7}$$

$$v_2 = \frac{DotProduct(u, e_2)}{DotProduct(e_2, e_2)}$$

$$v_2 = \frac{1}{5}$$

$$v_3 = \frac{DotProduct(u, e_3)}{DotProduct(e_3, e_3)}$$

$$v_3 = \frac{3}{35}$$

$$u = \frac{e_1}{7} + \frac{e_2}{5} + \frac{3\,e_3}{35}$$

Given:

$$u = \begin{bmatrix} 0 \\ 1 \\ 5 \end{bmatrix}$$

$$e_1 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}, e_2 = \begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}, e_3 = \begin{bmatrix} 6 \\ 3 \\ -5 \end{bmatrix}$$

$$v_1 = \frac{DotProduct(u, e_1)}{DotProduct(e_1, e_1)}$$

$$v_1 = \frac{8}{7}$$

$$v_2 = \frac{DotProduct(u, e_2)}{DotProduct(e_2, e_2)}$$

$$v_2 = -\frac{2}{5}$$

$$v_3 = \frac{DotProduct(u, e_3)}{DotProduct(e_3, e_3)}$$

$$v_3 = -\frac{11}{35}$$

$$u = \frac{8\,e_1}{7} - \frac{2\,e_2}{5} - \frac{11\,e_3}{35}$$

Given:

$$u = \begin{bmatrix} 3 \\ -1 \\ 1 \end{bmatrix}$$

$$e_1 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}, e_2 = \begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}, e_3 = \begin{bmatrix} 6 \\ 3 \\ -5 \end{bmatrix}$$

$$v_1 = \frac{DotProduct(u, e_1)}{DotProduct(e_1, e_1)}$$

$$v_1 = \frac{4}{7}$$

$$v_2 = \frac{DotProduct(u, e_2)}{DotProduct(e_2, e_2)}$$

$$v_2 = 1$$

$$v_3 = \frac{DotProduct(u, e_3)}{DotProduct(e_3, e_3)}$$

$$v_3 = \frac{1}{7}$$

$$u = \frac{4\,e_1}{7} + e_2 + \frac{e_3}{7}$$

Given:

$$u = \begin{bmatrix} 0 \\ 5 \\ 0 \end{bmatrix}$$

$$e_1 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}, e_2 = \begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}, e_3 = \begin{bmatrix} 6 \\ 3 \\ -5 \end{bmatrix}$$

$$v_1 = \frac{DotProduct(u, e_1)}{DotProduct(e_1, e_1)}$$

$$v_1 = \frac{5}{14}$$

$$v_2 = \frac{DotProduct(u, e_2)}{DotProduct(e_2, e_2)}$$

$$v_2 = -2$$

$$v_3 = \frac{DotProduct(u, e_3)}{DotProduct(e_3, e_3)}$$

$$v_3 = \frac{3}{14}$$

$$u = \frac{5\, e_1}{14} - 2\, e_2 + \frac{3\, e_3}{14}$$

Given:

$$u = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

$$e_1 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}, e_2 = \begin{bmatrix} 1 \\ -2 \\ 0 \end{bmatrix}, e_3 = \begin{bmatrix} 6 \\ 3 \\ -5 \end{bmatrix}$$

$$v_1 = \frac{DotProduct(u, e_1)}{DotProduct(e_1, e_1)}$$

$$v_1 = \frac{13}{14}$$

$$v_2 = \frac{DotProduct(u, e_2)}{DotProduct(e_2, e_2)}$$

$$v_2 = -\frac{3}{5}$$

$$v_3 = \frac{DotProduct(u, e_3)}{DotProduct(e_3, e_3)}$$

$$v_3 = -\frac{3}{70}$$

$$u = \frac{13\ e_1}{14} - \frac{3\ e_2}{5} - \frac{3\ e_3}{70}$$
