NOTE: See GitHub README.md for google drive links to data files. Link to GitHub repo (set to with solutions:

https://github.com/tylergarf/CSC396_Assignment4_Garfield_Tyler.git

Problem 1 (Est completion time ~ 3hrs)

Answer:

See notebook named, 'Garfield_Tyler_A4_Prob1' for problem solution.

Problem 2 (Est completion time ~ 5hrs)

Answer:

See notebook named, 'Garfield_Tyler_A4_Prob2' for problem solution.

Problem 3 (Est completion time ~ 1 hour)

Answer:

First performing step a.i of the algorithm:

$$w_1 \; and \; w_1 \; equates \; to \; a_{1\,1} = q_1 \cdot k_1 = \begin{vmatrix} 1 \\ 2 \\ 3 \end{vmatrix} \cdot \begin{vmatrix} 1 \\ 1 \\ 1 \end{vmatrix} = 6$$

$$w_1 and \; w_2 \; equates \; to \; a_{1\,2} = q_1 \cdot k_2 = \begin{vmatrix} 1 \\ 2 \\ 3 \end{vmatrix} \cdot \begin{vmatrix} 0 \\ 0 \\ 0 \end{vmatrix} = 0$$

$$w_1 and \;\; w_3 \;\; equates \; to \; a_{1\,3} = q_1 \cdot k_3 = \begin{vmatrix} 1 \\ 2 \\ 3 \end{vmatrix} \cdot \begin{vmatrix} 2 \\ 2 \\ 0 \end{vmatrix} = 6$$

Now performing step a.ii of the algorithm:

$$a_{1\,1} = \frac{a_{1\,1}}{\sqrt{|K_1|}} = \frac{a_{1\,1}}{2} = \frac{6}{2} = 3$$

$$a_{1\,2} = \frac{a_{1\,2}}{\sqrt{|k_1|}} = \frac{a_{1\,2}}{2} = \frac{0}{2} = 0$$

$$a_{1\,3} = \frac{a_{1\,3}}{\sqrt{|k_1|}} = \frac{a_{1\,3}}{2} = \frac{6}{2} = 3$$

Now performing step b:

For the a_1 vector we are calculating the bottom part of the given formula $\sum_k a_{i\,k} = 3 + 3 + 0 = 6$.

So:

$$a_{1\,1} = \frac{a_{1\,1}}{6} = \frac{3}{6} = 0.5$$

$$a_{1\,2} = \frac{a_{1\,2}}{6} = \frac{0}{6} = 0$$

$$a_{1\,3} = \frac{a_{1\,3}}{6} = 0.5$$

Now performing step c to get the final vector for z_1:

$$z_1 = \sum_j a_{i\,j} v_j = (a_{1\,1} v_1) + (a_{1\,2} v_2) + (a_{1\,3} v_3) = 0.5 \cdot \begin{vmatrix} 2 \\ 0 \\ 1 \end{vmatrix} + 0 \cdot \begin{vmatrix} 3 \\ 0 \\ 0 \end{vmatrix} + 0.5 \cdot \begin{vmatrix} 1 \\ 2 \\ 2 \end{vmatrix} = \begin{vmatrix} 1.5 \\ 1 \\ 1.5 \end{vmatrix}$$

FINALL ANSWER: $z_1 = \begin{vmatrix} 1.5 \\ 1 \\ 1.5 \end{vmatrix}$