

Math 260 – Quiz # 6

Name: Solution

Sr #: _____

Use Cramer's rule to solve the following system:

$$x_1 + 4x_2 + 2x_3 = 3$$

$$4x_1 + 2x_2 + x_3 = 1$$

$$2x_1 - 2x_2 - 5x_3 = -3$$

$$\Delta = \begin{vmatrix} 1 & 4 & 2 \\ 4 & 2 & 1 \\ 2 & -2 & -5 \end{vmatrix} = \begin{vmatrix} -7 & 0 & 0 \\ 4 & 2 & 1 \\ 2 & -2 & -5 \end{vmatrix} = -7 \begin{vmatrix} 2 & 1 \\ -2 & -5 \end{vmatrix} = -7(-8) = 56$$

$$\Delta x_1 = \begin{vmatrix} 3 & 4 & 2 \\ 1 & 2 & 1 \\ -3 & -2 & -5 \end{vmatrix} = \begin{vmatrix} 1 & 0 & 0 \\ 1 & 2 & 1 \\ -3 & -2 & -5 \end{vmatrix} = -8$$

$$\Delta x_2 = \begin{vmatrix} 1 & 3 & 2 \\ 4 & 1 & 1 \\ 2 & -3 & -5 \end{vmatrix} = \begin{vmatrix} 3 & 0 & -3 \\ 4 & 1 & 1 \\ 2 & -3 & -5 \end{vmatrix} = 3 \begin{vmatrix} 1 & 1 \\ -3 & -5 \end{vmatrix} - 3 \begin{vmatrix} 4 & 1 \\ 2 & -3 \end{vmatrix} \\ = 3(-2) - 3(-14) = 36$$

$$\Delta x_3 = \begin{vmatrix} 1 & 4 & 3 \\ 4 & 2 & 1 \\ 2 & -2 & -3 \end{vmatrix} = \begin{vmatrix} 3 & 2 & 0 \\ 4 & 2 & 1 \\ 2 & -2 & -3 \end{vmatrix} = 3 \begin{vmatrix} 2 & 1 \\ -2 & -3 \end{vmatrix} - 2 \begin{vmatrix} 4 & 1 \\ 2 & -3 \end{vmatrix} \\ = 3(-4) - 2(-14) = 16$$

$$x_1 = \frac{\Delta x_1}{\Delta} = \frac{-8}{56} = -\frac{1}{7}$$

$$x_2 = \frac{\Delta x_2}{\Delta} = \frac{36}{56} = \frac{9}{14}$$

$$x_3 = \frac{\Delta x_3}{\Delta} = \frac{16}{56} = \frac{2}{7}$$