MAU11S02 first Friday quiz, week 2
Friday 4/2/22 ANSWERS

Rules and procedures.
1. Attempt 3 questions. Only *your first three answers* will be marked. **2.** Each question carries 20 marks, so the maximum quiz mark is 60. **3.** If a particular method of solution is stipulated, you get no marks if you don't use it. **4.** ***Show all work.*** No marks will be given for answers which do not show the calculations. **5.** Your answers should be scanned and submitted to Blackboard as a 'Friday assignment.'

Question 1. Solve by Cramer's Rule (no other method)

$$2x + 7y = 8; \quad 1x + 8y = 2$$

Answer.

$$\begin{vmatrix} 2 & 7 \\ 1 & 8 \end{vmatrix} = 9, \quad \begin{vmatrix} 8 & 7 \\ 2 & 8 \end{vmatrix} = 50, \quad \begin{vmatrix} 2 & 8 \\ 1 & 2 \end{vmatrix} = -4,$$

$$x = \frac{50}{9}, \quad y = \frac{-4}{9}$$

Question 2.
Calculate the adjoint matrix, and hence invert

$$\begin{bmatrix} 2 & 7 \\ 1 & 8 \end{bmatrix}$$

Answer.

$$\left(\frac{1}{9}\right) \begin{bmatrix} 8 & -7 \\ -1 & 2 \end{bmatrix}$$

Question 3. Given the equations below, use Cramer's Rule, no other method, calculate the two determinants needed to compute x, and hence compute x.

$$-1x + 2y + -5z = -9$$
$$1x + 2y + -1z = 3$$
$$3x + 0y + 8z = 22$$

Question 4. Given the same equations as in Question 3, Calculate y and z.

Answer.

$$\begin{vmatrix} -1 & 2 & -5 \\ 1 & 2 & -1 \\ 3 & 0 & 8 \end{vmatrix} = -8 \quad \begin{vmatrix} -9 & 2 & -5 \\ 3 & 2 & -1 \\ 22 & 0 & 8 \end{vmatrix} = -16 \quad \begin{vmatrix} -1 & -9 & -5 \\ 1 & 3 & -1 \\ 3 & 22 & 8 \end{vmatrix} = -12 \quad \begin{vmatrix} -1 & 2 & -9 \\ 1 & 2 & 3 \\ 3 & 0 & 22 \end{vmatrix} = -16$$

$$x = \frac{-16}{-8} = 2 \quad y = \frac{-12}{-8} = 1.5 \quad z = \frac{-16}{-8} = 2$$

Question 5. A parallelopiped is a solid figure analogous to a parallelogram. It has six parallel faces (for example, a cube). The volume of a parallelopiped with a corner P and three adjacent corners Q, R, S, is the absolute value of $(Q - P) \cdot ((R - P) \times (S - P))$.

$P = (3, 1, 4)$, $Q = (1, 3, -2)$, $R = (4, 0, 8)$, $S = (1, 1, 0)$. Calculate the volume.

Answer.

determinant (-2,2,-6),(1,-1,4),(-2,0,-4) = -4, volume 4