

MAU11S02 first Monday quiz, week 2

Monday 8/2/21 due 4pm Monday 15/2/21

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 'Monday assignment.'

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

$$-1x + 1y = -1; \quad -3x + 5y = -1$$

Question 2. Calculate the adjoint matrix, and hence invert

$$\begin{bmatrix} -1 & 1 \\ -3 & 5 \end{bmatrix}$$

Question 3. This and the next question will be to solve the linear system

$$\begin{aligned} 1x + -2y + 6z &= 18 \\ 3x + -6y + 17z &= 51 \\ -2x + 6y + -18z &= -50 \end{aligned}$$

using Cramer's Rule (no other method). Writing this in the form $Px + Qy + Rz = S$, calculate the determinant of the matrix with columns P, Q, R , and then calculate the determinant of the matrix with columns S, Q, R . Hence compute x .

Question 4. Calculate the other two determinants arising in Cramer's Rule (3×3 case) and hence calculate y and z .

Question 5. A parallelopiped is a solid figure analogous to a parallelogram. It has six parallel faces (for example, a cube). If it has one corner at the origin adjacent to three corners P, Q, R , then the other 4 corners are various sums of these points. The volume of the parallelepiped is $\pm \vec{OP} \cdot (\vec{OQ} \times \vec{OR})$, and the volume of the tetrahedron $OPQR$ is one-sixth of this. Calculate the volume of $OPQR$ given $P = (2, 1, 2), Q = (8, 5, 10), R = (3, 1, -1)$.