MAU11S02 second Monday quiz ANSWERS
Monday 15/2/21 due 4pm Monday 22/2/21

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. Calculate the adjoint, and hence the inverse (no other method), of the following matrix.

$$\begin{bmatrix} 2 & 6 & -4 \\ -2 & -6 & 5 \\ 3 & 11 & -6 \end{bmatrix}$$

Answer.

$$\det -4 \quad \text{adjoint} \begin{bmatrix} -19 & -8 & 6 \\ 3 & 0 & -2 \\ -4 & -4 & 0 \end{bmatrix} \quad \text{inverse} \quad \begin{bmatrix} 4.75 & 2 & -1.5 \\ -0.75 & -0 & 0.5 \\ 1 & 1 & -0 \end{bmatrix}$$

Question 2. Let

$$A = \begin{bmatrix} 2 & 6 & -12 \\ 1 & 3 & -10 \\ -3 & -10 & 9 \end{bmatrix} B = \begin{bmatrix} -1 & 1 & 5 \\ -2 & 3 & 2 \\ 1 & 0 & -4 \end{bmatrix}$$

Calculate (i) AB (ii) $\det(A)$ (iii) $\det(B)$ (iv) $\det(AB)$.

Answer.

$$AB = \begin{bmatrix} -26 & 20 & 70 \\ -17 & 10 & 51 \\ 32 & -33 & -71 \end{bmatrix},$$

$$\det(A) = (2, 6, -12) \cdot (-73, 21, -1) = -8, \quad \det(B) = (-1, 1, 5) \cdot (-12, -6, -3) = -9,$$
$$\det(AB) = (-26, 20, 70) \cdot (973, 425, 241) = 72$$

Question 3. Calculate the $(1,1)$- and $(1,2)$- minors of the matrix below.

$$A = \begin{bmatrix} 1 & 1 & -3 & -7 \\ 1 & 2 & -6 & -16 \\ -2 & -3 & 9 & 24 \\ 1 & -1 & 4 & 13 \end{bmatrix}$$

Question 4. Calculate the $(1,3)$- and $(1,4)$- minors of the above matrix, and with its four minors calculated, compute its determinant.

Answer. 1 1 minor 0 cofactor 0
1 2 minor -7 cofactor 7
1 3 minor 5 cofactor 5
1 4 minor 1 cofactor -1
Determinant -1.

Question 5. Calculate the adjoint of the following matrix. Can it be used to calculate the inverse?

$$\begin{bmatrix} 2 & 0 & 2 \\ -3 & 1 & 2 \\ 0 & 3 & 15 \end{bmatrix}$$

Adjoint is

$$\begin{bmatrix} 2 & 0 & 2 \\ -3 & 1 & 2 \\ 0 & 3 & 15 \end{bmatrix}$$

One can't; determinant is zero, as is product of matrix and adjoint.