# MAU11S02 second Friday quiz, week 3
# Friday 11/2/22 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 'Monday assignment.'

**Question 1.** Using the adjoint matrix, no other method, invert

$$\begin{bmatrix} -2 & -4 & 16 \\ -3 & -6 & 25 \\ 3 & 8 & -30 \end{bmatrix}$$

Answer.

```
determinant 4
adjoint
      -20        8       -4
      -15       12        2
       -6        4        0

inverse
       -5        2       -1
    -3.75        3      0.5
     -1.5        1        0
```

**Question 2.** Let $P, Q, R$ be the columns of the two matrices below. In each case, determine whether $O, P, Q, R$ are coplanar.

$$\begin{bmatrix} 0 & 0 & -1 \\ 1 & 1 & 1 \\ 1 & 1 & 3 \end{bmatrix} \qquad \begin{bmatrix} -1 & 3 & 5 \\ 3 & -10 & -17 \\ 2 & -4 & -6 \end{bmatrix}$$

Answer.

```
  -1   3   5
   3 -10 -17
   2  -4  -6

Determinant = $(-1,3,5)dot(-8,-16,8)=0$.
```

```
Yes

 -1 -1 -5
 -1 -3 -9
  1 -1  1

Determinant = $(-1,-1,-5)dot(-12,-8,4)=0$
Yes.
```

**Question 3.** Find the first two minors in the cofactor expansion on the 2nd row of the following matrix.

$$\begin{bmatrix} -1 & 2 & 2 & -2 \\ 2 & -5 & -4 & 6 \\ 3 & -9 & -6 & 11 \\ 1 & -1 & 0 & 2 \end{bmatrix}$$

**Question 4.** Find the second two minors, along the 2nd row, and hence calculate the determinant of the matrix.

Answer.

```
cofactor expansion along row 2
       -1        2        2       -2
        2       -5       -4        6
        3       -9       -6       11
        1       -1        0        2

       -1        2        2       -2
        2       -5       -4        6
        3       -9       -6       11
        1       -1        0        2
2 1 minor 2 cofactor -2
2 2 minor 10 cofactor 10
2 3 minor 5 cofactor -5
2 4 minor 6 cofactor 6
2
```

**Question 5.** Calculate the adjoint of the following matrix. Can it be used to invert the matrix?

$$\begin{bmatrix} 1 & 3 & 5 \\ 1 & 1 & 3 \\ -3 & -12 & -18 \end{bmatrix}$$

Answer.

```
determinant 0; inverse undefined; adjoint    (CORRECTED)
       18       -6        4
        9       -3        2
       -9        3       -2
```