MAU11S02 second Monday quiz, week 3
Monday 7/2/22 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

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

Answer. Determinant $= (-2,-4,2)\cdot(-10,8,4) = -4$.

```
adjoint
      -10        -4        -4
        8         2         4
        4        -0         4

inverse
      2.5         1         1
       -2      -0.5        -1
       -1         0        -1
```

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.

$$\begin{bmatrix} 2 & 4 & 10 \\ 3 & 8 & 19 \\ 2 & 1 & 4 \end{bmatrix} \qquad \begin{bmatrix} -2 & -6 & 6 \\ -1 & -3 & 5 \\ -1 & -5 & 7 \end{bmatrix}$$

Answer. (a) Determinant $= (2,4,10)\cdot(13,26,-13) = 0$: yes. (b) Determinant $= (-2,-6,6)\cdot(4,2,2) = -8$: no.

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

$$\begin{bmatrix} -1 & 1 & -1 & 3 \\ 1 & -3 & 7 & -13 \\ 3 & 0 & -4 & 4 \\ 2 & -1 & -1 & -3 \end{bmatrix}$$

Question 4. Find the second two minors, along the 3rd row, and hence calculate the determinant of the matrix.
Answer.

```
cofactor expansion along row 3
       -1        1       -1        3
        1       -3        7      -13
        3        0       -4        4
        2       -1       -1       -3
3 1 minor 8 cofactor -8
3 2 minor -12 cofactor -12
3 3 minor 4 cofactor -4
3 4 minor 0 cofactor 0
-8
```

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

$$\begin{bmatrix} -1 & -1 & -5 \\ -1 & -3 & -9 \\ 1 & -1 & 1 \end{bmatrix}$$

Answer.

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

inverse undefined: the answer is no.
```