MAU11S02 Group A2 Quiz 04 3pm 20/2/19 ANSWERS

Rules and procedures.
1. Answers must be handed up at the end of the tutorial, no other time. **2.** Attempt 3 questions. Only *your first three answers* will be marked. **3.** Each question carries 10 marks, so the maximum quiz mark is 30. **4.** Marked quizzes will be returned, and answers published, the following week. **5.** If a particular method of solution is stipulated, you get no marks if you don't use it. **6.** The (9) quizzes will contribute 20% to your overall mark. **7.** You are allowed to collaborate and compare answers during the tutorial. **8.** ***Show all work.*** No marks will be given for answers which do not show the calculations.

Answer 1.

```
-2 -10  -4   2 -10
 1   4   1  -1   4
 0   0   0   1  -3
 3  13   4  -4  16

 1   0  -3   0  -3
 0   1   1   0   1
 0   0   0   1  -3
 0   0   0   0   0  in rref
```

Basis for row space:

$$[1\ 0\ -3\ 0\ -3], [0\ 1\ 1\ 0\ 1], [0\ 0\ 0\ 1\ -3].$$

Basis for column space:

$$\begin{bmatrix} -2 \\ 1 \\ 0 \\ 3 \end{bmatrix}, \begin{bmatrix} -10 \\ 4 \\ 0 \\ 13 \end{bmatrix}, \begin{bmatrix} 2 \\ -1 \\ 1 \\ -4 \end{bmatrix}.$$

Answer 2.

$$x_3 = s, \quad x_5 = t$$
$$x_1 - 3s - 3t = 0$$
$$x_2 + s + t = 0$$
$$x_4 - 3t = 0$$
$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{bmatrix} = \begin{bmatrix} 3s+3t \\ -s-t \\ s \\ 3t \\ t \end{bmatrix} = s \begin{bmatrix} 3 \\ -1 \\ 1 \\ 0 \\ 0 \end{bmatrix} + t \begin{bmatrix} 3 \\ -1 \\ 0 \\ 3 \\ 1 \end{bmatrix}$$

Basis for nullspace: $[3 \ -1 \ 1 \ 0 \ 0]^T$, $[3 \ -1 \ 0 \ 3 \ 1]^T$.

Answer 3.

```
Gauss-Jordan elimination:
  -2  -4  -3  -4
   3   7   5   6
   1   5   3   3

   1   0 1/2   0
   0   1 1/2   0
   0   0   0   1  in rref
```

Thus the first 3 columns are linearly dependent, but not columns 1,2,4.

Answer 4.

$$\begin{bmatrix} -2 & -4 & -4 \\ 3 & 7 & 6 \\ 1 & 5 & 3 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 3 \end{bmatrix} = \begin{bmatrix} -18 \\ 28 \\ 15 \end{bmatrix}$$

Answer 5.

```
Gauss-Jordan elimination
    -2    -4    -4     1
     3     7     6     1
     1     5     3     3

     1     0     0   5/2
     0     1     0   5/2
     0     0     1    -4  in rref
```

Solution: $[5/2\ 5/2\ -4]^T$.