MAU11S02 Group A1 Quiz 04 9am 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.

```
Matrix
 -2  2  0 -2
  1  1  4  5
 -3  2 -2 -5
Reduced Row-Echelon Form:
 1 0 2 3
 0 1 2 2
 0 0 0 0
Row space [1 0 2 3], [0 1 2 2]
Column space [-2 1 -3]^T, [2 1 2]^T
```

Nullspace

$$x_1 + 2x_3 + 3x_4 = 0$$
$$x_2 + 2x_3 + 2x + 4 = 0$$
$$x_3 = s$$
$$x_4 = t$$
$$\left\{ \begin{bmatrix} -2s \\ -3t \\ s \\ t \end{bmatrix} : s, t \in \mathbb{R} \right\}$$
$$\text{basis for nullspace } \begin{bmatrix} -2 \\ -2 \\ 1 \\ 0 \end{bmatrix}, \quad \begin{bmatrix} -3 \\ -2 \\ 0 \\ 1 \end{bmatrix}$$

Answer 2. See the previous question.

Answer 3. Gauss-Jordan elimination, RREF

```
     7     1     2     3  *(1/7)   =R1
     6     2     3     1   -6*R1
     6     2     2     4   -6*R1

     1   1/7   2/7   3/7   -1/7*R2
     0   8/7   9/7 -11/7  *(7/8)   =R2
     0   8/7   2/7  10/7   -8/7*R2

     1     0   1/8   5/8   -1/8*R3
     0     1   9/8 -11/8   -9/8*R3
     0     0    -1     3  *(-1)   =R3

     1     0     0     1
     0     1     0     2
     0     0     1    -3  in rref
```

Answer 4.

$$\begin{bmatrix} 7 & 1 & 2 \\ 6 & 2 & 3 \\ 6 & 2 & 2 \end{bmatrix} \begin{bmatrix} 3 \\ 1 \\ 4 \end{bmatrix} = \begin{bmatrix} 30 \\ 32 \\ 28 \end{bmatrix}.$$

Answer 5.

```
     7     1     2     3  *(1/7)   =R1
     6     2     3     1   -6*R1
     6     2     2     4   -6*R1
... rref:
     1     0     0     1
     0     1     0     2
     0     0     1    -3  in rref
```

Solution: $[1\ 2\ -3]^T$.