Submission for Tuesday 22nd March 2022 – 17 minutes. Max Marks: 5

Instructions: Open notes and textbook; consultation and use of calculators, computers and internet not allowed. You may use any **known** result. This includes all propositions and observations in the lecture slides, and results from tutorials. If you use any other result from any other source, including the textbook, you have to give a full proof of that result.

- a) For the matrix $A = [v_1 \ v_2 \ v_3 \ v_4 \ v_5]$ given below, find a basis for Col A which consists of columns of A, *but not including* v_1 . You must briefly describe your method, and clearly show all your calculations.

 (3 marks)
- b) For a general $m \times n$ matrix $B = [\mathbf{u}_1 \ \mathbf{u}_2 \ \dots \ \mathbf{u}_n]$ with non-zero columns, which are <u>not</u> <u>linearly independent</u>, explain with reference to any known results, why it is always possible to have a basis of Col B consisting of columns of B, *not including* \mathbf{u}_1 . (2 marks)

SOLUTION & RUBRIC

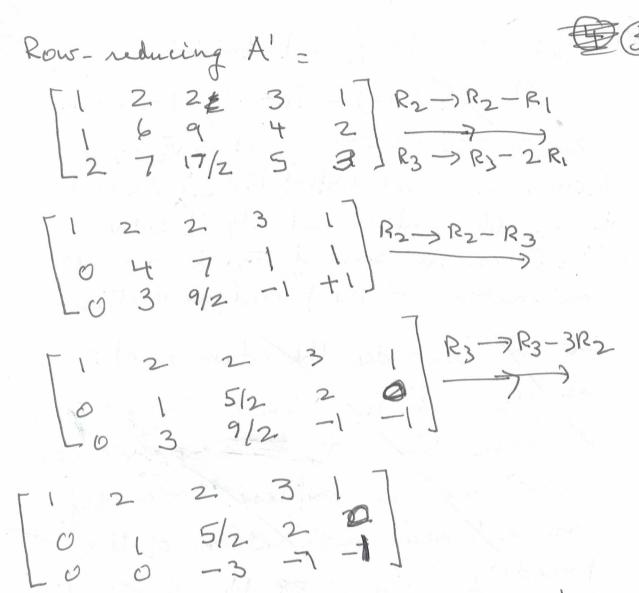
a) There are different possible answers and methods. So:

Any Cornect Answer -72.5 marker.

Melthad -72.5

Cateps and bruef emplanation to be shown. No marker for melthod if answer is wrong.)

One such method is presented; it keeps the calculations to the minimum a) - continued We tarmite the columns of A, moving to the last place, giving the matrise A = [54 52 53 55 57] Cleanly Col A = Col A'
(3 also shipled by to 1st cohumn; this is
only to simplify the calculations, and is not necessary.) - We now-reduce A! From the calculations (see page 3) it follows that the 1st, 2nd, 3nd whom of A' form a basis for Col A1 = Col A: So1-Answer: & 54, 52, 53} is one possible basis for Col A, which does not ni clude F, Rubric is in the hon on page I. There are other possible selections of 3 lin. videp. columns, not including Remark: There was an voros in part W) -> it was meant to be PROVE/ DISPROVE - So all the marks and



Without obtaining an RREF matrix,
it is dear from the echelon form
above, that columns L, 2, 3 of

A are pivot columns,
hence indicate a basis of Col A'

= Col A.