

Math 54 Green Questions (let me know of any mistakes and use at your own risk :)

Chapter 1.1

Q 23

(a) T (b) F (a) T (b) T

Q 24

(a) T (b) F (c) F (d) T

Chapter 1.2

Q 21

(a) F (b) F (c) T (d) T (e) F

Q 22

(a) F (b) F (c) T (d) T (e) T

Q 23

The system is consistent because it would be impossible to have a row in the augmented matrix of the form $[0 \ 0 \ 0 \ 0 \ 0 \ 1]$ (corresponding to an equation of the form $0 = 1$).

Q 24

Inconsistent. This is exactly the situation described in the previous question.

Chapter 1.3

Q 24 (a) T (b) T (c) F (d) T (e) T

Chapter 1.4

Q 24 (a) T (b) T (c) T (d) T (e) F (f) T

Q 31 Not enough pivots to have one in each row of A .

Q 34 Because A must have a pivot in each row.

Chapter 1.5

Q 23 (a) T (b) F (c) F (d) F (e) T

Q 24 (a) F (b) T (c) T (d) T (e) T

Q 29 (a) No. The REF form of the augmented matrix is $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$ with unique solution $x = y = z = 0$.

(b) Yes because the augmented matrix for this case will be $\begin{bmatrix} 1 & 0 & 0 & * \\ 0 & 1 & 0 & * \\ 0 & 0 & 1 & * \end{bmatrix}$.

(note before applying row reduction the far right column will be equal to the vertical vector \mathbf{b} however after applying row reduction to get the coefficient matrix into this form the far right column will contain some jumbled up version of the values of \mathbf{b} .)

Q 30 (a) Yes. A 3×3 matrix with only 2 pivots must have 1 free variable (why?) and the bottom row must be all zeros (try putting a 1 there and writing it in REF form with only 2 pivots).

(b) No, because the last row of the coefficient matrix is all zeros, a 1 at the bottom of the far right column of the augmented matrix would make things inconsistent.

Q 31 (a) The REF of this matrix has to look like: $\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 0 \end{bmatrix}$, Thus the only solution is $x = y = 0$.

(b) No, again it is easy to use the last row to make the system inconsistent.

Q 32 (a) Yes, because with only 2 pivots and 4 variables the system must have 2 free parameters.

(b) Yes, because the coefficient matrix cannot possibly have a row of zeros with which to construct an inconsistent row.

Chapter 1.7

Q 21 (a) F (b) F (c) T (d) T

Q 22 (a) T (b) F (c) T (d) F

Chapter 1.9

Q 23 (a) T (b) T (c) F (d) F (e) F

Q 24 (a) F (b) T (c) T (d) F (e) T

Chapter 2.1

Q 15 (a) F (b) F (c) T (d) F (e) F

Q 16 (a) F (b) T (c) F (d) F (e) F

Q 23 Hint: try using the non-trivial solution with $CA = I_n$.

Q 24 The solution is $\mathbf{x} = D\mathbf{b}$.

Chapter 2.2

Q 9 (a) T (b) F (c) F (d) T (e) T

Chapter 2.3

Q 11 (a) T (b) T (c) F (d) T (e) T

Q 12 (a) T (b) T (c) T (d) F (e) T

Q 13 True, when all diagonal entries are non-zero (b/c pivots).

Q 15 Same answer.

Chapter 2.9

Q 15 $\text{Col}A = \mathbb{R}^3$ yes, because you have 3 linearly independent vectors. $\text{Nul}A$ is dimension 2 so I'd say it's like \mathbb{R}^2 but the textbook might be pendantic about that.

Chapter 3.2

Q 27 (a) T (b) F (c) T (d) F

Q 28 (a) F (b) F (c) F (d) F

Q 39 (a) -12 (b) -15 (c) 4 (d) $-1/3$ (e) -27

Chapter 4.1

Q 23 (a) F (b) F (not always) (c) F (not always) (d) T (e) not a math question

Q 24 (a) T (b) T (c) T (d) F (if you're being really pendantic) (e) T

Chapter 4.2

Q 25 (a) T (b) F (c) T (d) F (e) T (f) T

Q 26 (a) T (b) T (c) F (d) T (e) T (f) T

Chapter 4.3

Q 21 (a) F (b) F (c) T (d) F (e) F

Q 22 (a) F (b) T (c) T (d) F (e) T

Chapter 4.4

Q 15 (a) T (b) F (c) F

Q 16 (a) T (b) T (c) T

Chapter 4.5

Q 19 (a) T (b) T (c) F (d) F (e) T

Q 20 (a) T (b) F (if free variables T) (c) T if they mean *only* spanned by an infinite set, F otherwise (d) F (e) T

Chapter 4.6

Q 10 1

Q 11 3

Q 12 2

Q 13 5 for both.

Q 14 3 for both.

Q 15 2.