MAT313 Linear Algebra Spring 2024

Sample Quiz 8

Note Lessons 20-22 must be completed and corrected by Sunday to take this quiz. Lesson 22 has three homework problems almost exactly like this quiz.

Remember, we learned in Lesson 20 that a subspace, V, is a set of vectors which is closed under addition and closed under scalar multiplication. We learned that the null space and the range of a matrix are both subspaces.
We learned that a basis of a subspace, V, is a list of linearly independent vectors whose span is V. The dimension of a subspace is the number of vectors in the basis. The nullity of a matrix is the dimension of the null space and the rank of a matrix is the dimension of the range of the matrix. In Lesson 22 we learned how to find the nullity and the rank and a basis of the range and a basis of the null space of a matrix. You will do this on your Quiz 8.

MAT 313
Spring 2023

Quiz 8

Let $A = \begin{bmatrix} & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \end{bmatrix}$

1. Do row reduction to Echelon Form following our course's algorithm, and box the leaders.
2. What is the nullity and the rank?
3. Write the range as a span of pivot columns.
4. Check the pivot columns are linearly independant.
5. Write a basis for the range and explain why it is the basis.

Quiz 8 HW

1. Continue row reduction to Reduced Echelon Form
2. Write the null space as a span of directions
3. Check the null space using matrix multiplication.
4. Check that the directions are linearly independant
5. Find a basis for the null space and explain why it is a basis.

Everyone will have a different matrix. The matrix will have four or five rows and six to eight columns requiring only a few row actions to Echelon form if you follow our algorithm. You will not have time to finish if you don't follow the effective algorithm taught in this class. Be sure to stop at Echelon form in the timed part.

Scoring is one point each:
Timed Part:

(1) -1 row red error, must box leaders, choose the correct row actions, write row actions correctly, and do the row actons correctly to Echelon form
(2) -1 nullity incorrect, rank incorrect
(3) -1 incorrect pivot columns
(4) -1 lin indep has an incorrect set up or incorrec row reduction
(5) -1 basis incorrect not explained

Homework

(1) -1 row reduction error, not Red Ech form
(2) -1 did not show solving for leaders, did not write as a span, wrong directions
(3) -1 matrix mult work not shown incorrect
(4) -1 lin indep incorrect set up row red
(5) -1 basis incorrect not explained