Grading Scheme for LA Assignment 5

February 21, 2025

Question 1: Rank-Nullity Theorem (10 Marks)

Grading Breakdown:
- Statement of Rank-Nullity Theorem (2 Marks)
  Correctly stating that rank(T) + nullity(T) = dim(V).
- Proof Setup (2 Marks)
  Clearly defining ker(T) and im(T) and setting up the proof correctly.
- Logical Steps (4 Marks)
  Showing that ker(T) and im(T) are subspaces, and their dimensions add up to dim(V).
- Conclusion (2 Marks)
  Correctly concluding that the theorem holds with proper justification.

Question 2: L(V, W) as a Vector Space (10 Marks)

Grading Breakdown:
- Definition of L(V,W) and Operations (3 Marks)
  Clearly defining L(V,W), vector addition, and scalar multiplication.
- Proof of Closure Under Addition & Scalar Multiplication (3 Marks)
  Showing that these operations result in a transformation still within L(V,W).
- Verification of Vector Space Axioms (3 Marks)
  Checking properties such as associativity, distributivity, and existence of identity elements.
- Conclusion (1 Mark)
  Concluding that L(V,W) is a vector space over F.

Question 3: Dimension of L(V, W) (10 Marks)

Grading Breakdown:

- Understanding the Problem (2 Marks)
  Correctly interpreting dim(L(V,W)) in terms of bases.
- Constructing a Basis for L(V,W) (4 Marks)
  Providing a basis for L(V,W) using basis vectors of V and W.
- Dimensionality Calculation (3 Marks)
  Correctly computing $\dim(L(V,W)) = \dim(V) \times \dim(W)$.
- Conclusion (1 Mark)
  Final statement confirming the result.

Total: 30 Marks

This grading scheme ensures fair and structured assessment of student responses.