Syllabus for Linear Algebra (Math 271 and 272)

Basic definitions:
Vector space
Subspace
Span of a subset
Linear independence
Basis and dimension
Linear transformation
Kernel or null space
Image or range
Inverse of a matrix or linear transformation
Determinant and trace
Characteristic polynomial
Eigenvalues and eigenspaces
Diagonalizability
Similarity

Computational techniques:
Determine when a subset is a subspace
Basic matrix manipulations
Row operations on matrices
Solving systems of linear equations
Find the inverse of a matrix
Find a basis of a given subspace
Find the nullity, rank, trace, and determinant of a matrix
Find the null space N(T) and range R(T) of a linear transformation T
Given bases of V and W, find the matrix of a linear transformation $T : V \rightarrow W$

Given a matrix or linear transformation:
Compute its characteristic polynomial
Find its eigenvalues and eigenspaces

Basic results to know:
dim $N(T)$ + dim $R(T)$ = dim V
nullity (A) + rank (A) = number of columns of A
Criteria for A^{-1} to exist
Criteria for A to be diagonalizable

Write simple proofs of problems involving subspaces, linear maps, linear independence, spanning sets, null spaces and ranges.