

Part I: Calculations 60 %

- Determine whether a set of vectors is linearly dependent or independent; determine if they form a basis. The vectors could be functions.
- Find bases for the nullspace, row space and column space of a matrix.
- Use the GS method.
- Coordinates.
- Least squares method.

Part II: Theory 20 %

Here are some potential theory problems.

- Prove that the span of a finite set of vectors is a vector subspace.
- Prove that the intersection of two vector subspaces is a vector space.
- Prove that $r\mathbf{0} = \mathbf{0}$, where $\mathbf{0}$ is the zero vector of a vector space and r is any real number using only the vector space axioms and the axioms of arithmetic.
- Prove that coordinates of a vector $v \in V$ with respect to a given basis S are unique.
- One like T10 in 4.4.

Part III: Use Maple 20%

Same material as Part I. But, also know how to do basic algebra and how to plot simple graphs with Maple. Make sure you type your name on your work before printing!

Do not be surprised if you have to think.