MA 442 - Midterm 1 review

- The definition of a vector space (over $\mathbb{R}$).

- Examples of vector spaces including $\mathbb{R}^n$, polynomials P_d or $\mathbb{R}[x]$, function spaces like $\mathcal{F}(\mathbb{R}, \mathbb{R})$ and $\mathrm{Hom}(V, W)$.

- Criterion for a subset of a vector space to be a subspace.

- Linear (in)dependence of a subset of a vector space.

- Generating subset, span. Criterion for a subset to be generating.

- The definition of a basis, dimension.

- Conditions on a linear independent subset to be a basis. Conditions on a generating subset to be a basis.

- Definition of a linear transformation.

- A linear transformation is completey determined by its values on a basis.

- The kernel and image of a linear transformation.

- Surjective and injective linear maps and equivalent criteria.

- The dimension theorem for a linear transformation.

- The definition of $[x]_\beta \in \mathbb{R}^n$ where β is an ordered basis of an n-dimensional vector space V and $x \in V$.

- The definition of $[T]_\beta^\gamma$ where β is an ordered basis for V and γ is an ordered basis for W and $T\colon V \to W$ is a linear transformation.