

MATH 240 Ch: 4.3 Basis

Basis of a vector space

A set of vectors in a vector space V is linearly independent if it only has the trivial solution.

We can't necessarily just write this using a matrix, because we might not be dealing with matrices.

Ex. is $\{1, 1+t^2\}$ linearly independent?

$$c_1 \cdot 1 + c_2(1+t^2) = 0$$

We know that two vectors are linearly independent if one is not a multiple of another.

So we can say that yes these are linearly independent because they are not multiples of each other.

Ex2. is $\{2, 1+t, 3+2t\}$ linearly independent?

$$1(3+2t) + (-2)(1+t) + (-0.5)(2) = 0$$

therefore dependent.

Definition let V be a vector space and B is a set of n vectors. B is a basis of V if

1. B is linearly independent
2. $V = \text{span}B$

A matrix is *symmetric* if $\text{transpose}(A) = A$

How to find a basis of a vector space

Every spanning set contains a basis.

Get a vector that is a linear combination of the others and remove it and then repeat.