Det. A bours for a vector space V is a linearly independent subset of V whose spain is V.

\*There are usually infinitely many bases for one vector space, but they all have the same size, which is called the dimension of the vector space.

There are vector spaces with infinite dimension E.g. the set of all polynomials with the usual +, . a basis: \{ 1, \times, \times^2, \ldots \}

but we will only work with finite dimensional vector spaces in this class.

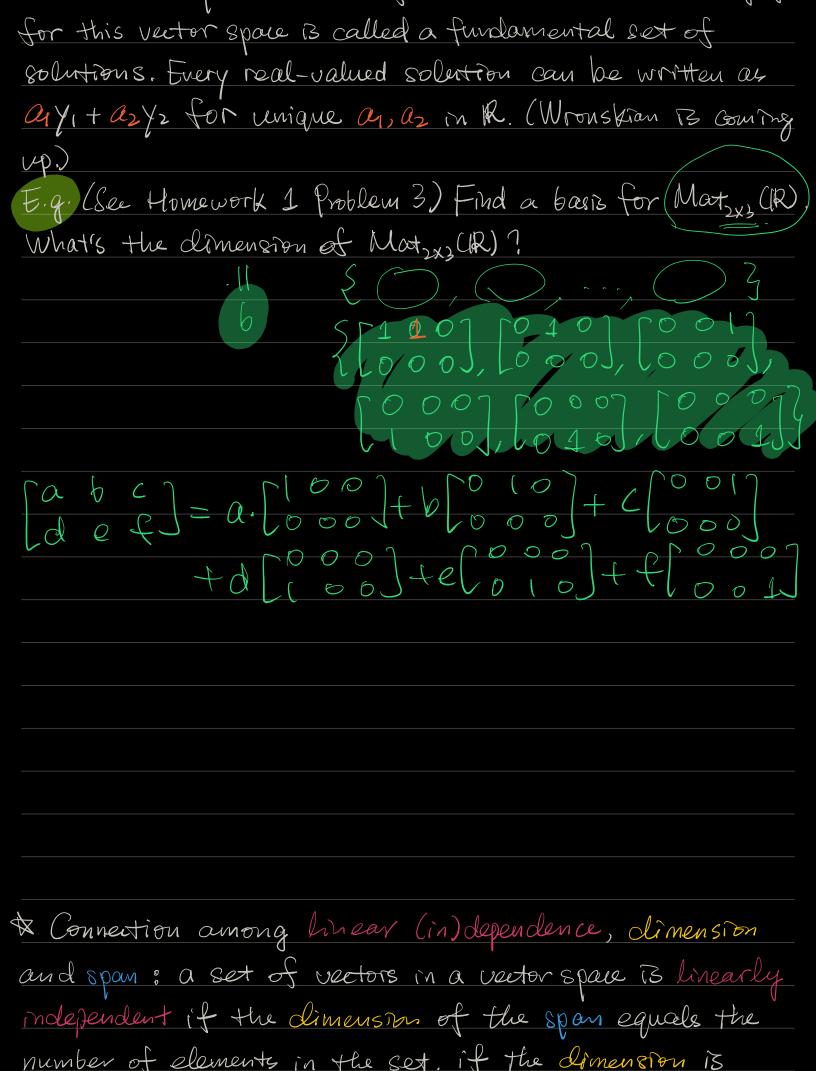
Observation: if  $\{e_1, \dots, e_n\}$  is a basis for a vector space V,

then every v in V is equal to  $a_1 \cdot e_1 + \dots + a_n \cdot e_n$  for

unique  $a_1, \dots, a_n$  in R/D. Therefore, by choosing a basis,

every vector space of dimension n can be identified with R/n.  $v = a_1 \cdot e_1 + \dots + a_n \cdot e_n = b_1 \cdot e_1 + \dots + b_n \cdot e_n$   $(a_1 - b_1) \cdot e_1 + \dots + (a_n - b_n) \cdot e_n = 0$   $a_1 - b_1 = 0, \dots, (a_n - b_n) = 0$   $a_1 = b_1, \dots, a_n = b_n$ 

Englations to the dofferential equation y"+ y'+ y = 0 is a vector space over R of dimension 2. A basis Syn, yi



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