- b → c
  - Suppose columns of $M(T)$ are linearly independent in $\mathbb{F}^{n,1}$;
  - By 2.39, the columns are a basis of $\mathbb{F}^{n,1}$
  - By definition of basis, the columns span $\mathbb{F}^{n,1}$
- c → b
  - suppose the columns span $\mathbb{F}^{n,1}$
  - By 2.42, the columns are a basis of $\mathbb{F}^{n,1}$
  - By definition of basis, the columns are linearly independent in $\mathbb{F}^{n,1}$
- d ⟷ e
  - use the same argument when showing b ⟷ c.
- b ⟷ d
  - Suppose the columns are linearly independent, thus they are basis of dimension n (by 2.39)
  - By 3.118, the column rank of $M(T)$ is equal the row rank of $M(T)$.