- **Proposition 4.4**: show $\dim\left(\left(C^{\perp}\right)^{\perp}\right) = \dim(C)$ and $C \subseteq (C^{\perp})^{\perp}$.
- **Proposition 4.5**: show $\forall y \in \mathbb{F}_q^{n-k}$, $yH \in C^{\perp}$, let $f_H(y) = yH$ so $\mathrm{im}(f_H) \subseteq C^{\perp}$ and show $\dim(\mathrm{im}(f_H)) = \dim(C^{\perp})$.
- **Proposition 4.6**: similar to prop 4.5, use that $P^T = P^{-1}$.