1. Let $X$, $Y$ be normed linear spaces and $T \in \mathcal{L}(X, Y)$. Show that the second dual $T'' \in \mathcal{L}(X'', Y'')$ is an extension of $T$.

Let $X$ be a Banach space and $Y$ a closed subspace of $X$.

2. Show the quotient space $X/Y$ is a Banach space and that the quotient map $\pi : X \to X/Y$ is a continuous surjection.

3. Show that the dual of the injection $\iota : Y \to X$ is the restriction $r : X' \to Y'$, $r(f) = f|_Y$, $f \in X'$. Find $\text{Rg}(r)$ and $\text{Ker}(r)$.

4. Show that the dual of the quotient map $\pi : X \to X/Y$ is an injection $\pi' : (X/Y)' \to X'$ and its range is $\text{Rg}(\pi') = Y^\circ$. 