1) If $M$ is a subspace of a B-space $X$, we recall that $M$ has finite codimension if $\text{codim} M = \dim(X/M) < \infty$. Show by an example that in this case, $M$ is not necessarily closed.

2) $X$ and $Y$ are B-spaces and $A \in B(X,Y)$. Assume that $\text{codim}(T) = \text{codim}(Y/R(A)) < \infty$. Show that $R(A)$ is closed.

3) Let $X$ be a B-space and $A \in B(X)$. We recall that $\lambda$ is in the residual spectrum if $\lambda$ is not an eigenvalue and $R(\lambda - A)$ is not dense. Show that:
   a) If $\lambda$ is in the residual spectrum of $A$, then $\lambda$ is in the point spectrum of $A'$
   b) If $\lambda$ is in the point spectrum of $A$, then $\lambda$ is either in the point or residual spectrum of $A'$.

4) What is the spectrum of the shift operator on $l^1$:
   \[ A(x_1, x_2, ..., ) = (x_2, x_3, ...). \]
   What is $A'$? [This can be a good example to understand pb 3)

5) Give an example of a bounded operator such that such that the range is not close. Prove that if $A$ is bounded, everywhere defined and an isometry, then $R(A)$ is closed.