ATTENTION! Do any 6 of the following 7 problems. Circle the problems you submit for grading.

1. State and prove Egoroff Theorem.

2. State and prove Riesz-Fischer Theorem.


4. a). State and prove Hahn Decomposition Theorem.
   b). State and prove Jordan Decomposition Theorem.

5. State and prove Riesz Representation Theorem for the dual of $L^p(X)$, $1 \leq p < \infty$.

6. Prove: If $X$ is a compact metric space and $F \in [C(X)]^*$ is a positive linear functional, then there exists a nonnegative Borel measure $\mu$ on $X$ such that

   $$F(f) = \int_X f \, d\mu$$

   for any $f \in C(X)$.

7. Let $X$ be a compact metric space. State and prove Riesz-Markov Theorem for the dual of $C(X)$. 