

FINAL EXAM,
Math 8602: Real Analysis, 10 May 2007

Write an exposition on one of the following three subjects. Include as many results, proofs, examples, comments and observations as you can. Your exposition should be ordered, complete and somewhat neatly written.

Compact, yet good mathematical style will be appreciated.

(100p) **Subject 1.** Analysis in Hilbert spaces.

[Riesz-Frechet and Lax-Milgram theorems, projections, complementarity, Hilbert basis, Bessel-Parseval identity]

(100p) **Subject 2.** The embedding theorems in Sobolev spaces.

[Sobolev-Gagliardo-Nirenberg, Morrey, Rellich-Kondrachov theorems, discussion on the smoothness of the domain, case of W_0 spaces]

(100p) **Subject 3.** Compactness criteria in functional spaces.

[Banach-Alaoglu and Kakutani theorems, sequential compactness, Ascoli-Arzela, Riesz-Frechet-Kolmogoroff, Rellich-Kondrachov theorems, Helly's theorem]