**Advanced Analysis (Math 417)**     **Name:** _____

**Exam 2**                          **May 2, 2008**

**Remark:** You may use, without proof or explicit citation, any theorem, lemma, corollary, or proposition which is proved in the book. Also you may use standard facts about the structure of the real numbers (facts from Math 317 for example). You must prove all other assertions you make. When in doubt, prove it. Or ask me, and I will tell you whether a particular assertion requires proof.

**1.** Give an example of a set $S \subset \mathbb{R}^2$ which is bounded but not Jordan measurable. Prove that the set $S$ you define is bounded but not Jordan measurable.

**2.** Prove that
$$\int_1^\infty \frac{\sin x}{x}\,dx$$
converges.

**3.** Let $f : \mathbb{R}^2 \to \mathbb{R}$ be given by
$$f(x,y) = e^{-x^2},$$
and let
$$S = \{(x,y) \ : \ 0 \le x \le 1 \text{ and } y = 1\}.$$

Calculate
$$\iint_S f(x,y)\,dA.$$

**Note:** You do not need to prove that $f$ is integrable over $S$.