Homework # 3, due Fri, Sep 23rd.

1. Expand the function x^2 in a Fourier cosine series on the interval $[0, \pi]$.

2. Expand the function x^2 in a Fourier sine series on $[0, \pi]$.

3. Expand the function $|\sin x|$ in a Foueir series valid on the interval $[-\pi, \pi]$.

4. Use Fourier series to prove that

$$\sum_{k=0}^{\infty} \frac{1}{(2k+1)^2} = \frac{\pi^2}{8}.$$

5. We know that the Fourier series of an odd founction consists of sine terms only. What additional symmetry conditions on f will imply that the sine coefficients with even indices be zero? Give an example satisfying that additional condition.