# Homework 5

#1 Read "A Mathematician's Apology" by G.H. Hardy (on line)

#2 Read the first five pages of "Mathematics and the Metaphysicians" by Bertrand Russell (in "Mysticism and Logic") (also on line)

#3. Prove that the directrixes of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ are $x = \pm \frac{a^2}{c}$

#4 Prove that there are just as many fractions between 0 and 1 as fractions between 0 and 10.

#5 True or False (and explain in a paragraph or two why we care)

a) The natural numbers $\mathbb{N}$ are countably infinite

b) The angles in any triangle add up to $180^\circ$

c) The theorems of mathematics are just as true as the laws of physics

d) There is no transfinite number between $\aleph_0$ and $2^{\aleph_0}$