Physics 4B: Problem Set 8 - Making magnetic fields

1. Find the magnetic field inside a rectangular toroid as a function of the distance r from its center.

2. Two currents, I_1 into the paper and I_2 out of the paper (where their magnitudes are the same) are arranged being on two vertices of an equilateral triangle of length L. Find the magnetic field vector from those two currents at the third vertex of that equilateral triangle.

3. Find the magnetic field along the axis of a single loop of current, I, of radius, a,

4. An otherwise infinitely straight line of current I has a circular loop of radius R coiled in it such that the center of the loop is its own radius above the wire and tangent to the straight length of the wire. Find the magnetic field at the center of the loop. You must include the field from the straight part of the wire as well as the loop.
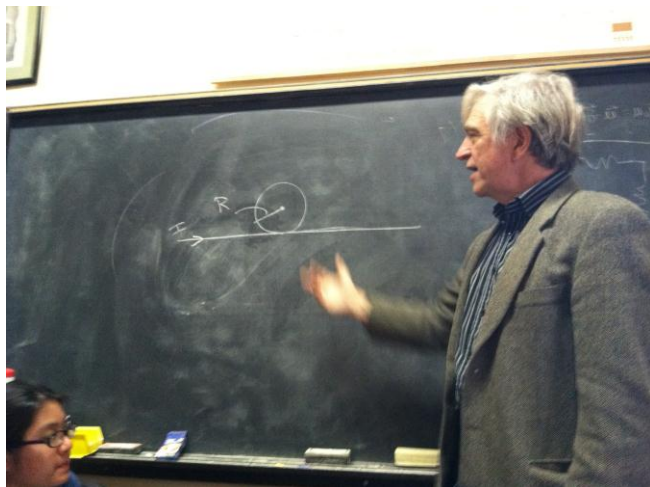
5. Helmholtz coils. Two circular coils of radius R carry the same current I such that the planes of the two coils are parallel and separated by a distance R. Their currents have a sense such that in between the coils along their shared axis, the magnetic field for each are parallel. Find the magnetic field at this center point in between the coils along their shared center axis.

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