1) You are continually having troubles with the CRT screen of your computer and wonder if it is due to magnetic fields from the power lines running in your building. A blueprint of the building shows that the nearest power line is as shown below. Your CRT screen is located at point P. Calculate the magnetic field at P as a function of the current I and the distances a and b. Segments BC and AD are arcs of concentric circles. Segments AB and DC are straight-line segments. (Hint: use Biot-Savart)

2) While studying intensely for your physics final you decide to take a break and listen to your stereo. As you unwind, your thoughts drift to newspaper stories about the dangers of household magnetic fields on the body. You examine your stereo wires and find that most of them are coaxial cable, a thin conducting wire at the center surrounded by an insulator, which is in turn surrounded by a conducting shell. The inner wire and the conducting shell are both part of the circuit with the same current (I) passing through both, but in opposite directions. As a way to practice for your physics final you decide to calculate the magnetic field in the insulator, and outside the coaxial cable as a function of the current and the distance from the center of the cable. As an additional challenge to yourself, you calculate what the magnetic field would be (as a function of the current and the distance from the center of the cable) inside the outer conducting shell of the coaxial cable. For this you assume that the inner radius of the conducting shell is R1 and the outer radius is R2. (Hint: use Ampere.)