Accelerator Physics Homework #2

1. S&E 3.1 (Hint: solve in the non-relativistic limit, and use Maxell’s Equations to find a relationship between $∂B\_{z}/∂r$ and $∂B\_{r}/∂z$)
2. S&E 3.3 (In other words, use the exact piecewise solution for the quadrupole, as in 3.2.1 and compare it to a thin quad with the same focal length in the middle of two 5 m straight sections). Express the answer as a matrix with the fractional deviation of the thin lens approximation from the exact solution.
3. We’ll find if very useful to evaluate a symmetric FODO cell, in which the ends are evaluated at the middle of the focusing quad. This is done by breaking the quad into two, each with a focal length of 2f

2f

-f

L

L

2f

* 1. Show that the transfer matrix for this cell is given by



* 1. Show that



* 1. Find the lattice functions **, **, and ** at all points, and plot them (Hint: what does the symmetry of the problem tell you  at the ends?)
1. Use the results of the previous problem to do S&E 3.12 (pretty easy now)