Accelerator Physics Homework #4

1. In a previous homework, you derived the general matrix for the propagation of the lattice functions  , ,and 



* 1. (5 points) Write explicit transformations for the three lattice function for the specific cases of
     1. A thin quadrupole of focal length *f*
     2. A drift of length *s*
  2. (5 points) Prove that the  and  functions can ever go negative in these cases.

1. When focusing a beam on a target, it is useful to be able to use corrector magnets to *independently* correct the position and angle at the target. For the figure described below, write expressions for the values of  and  which will give
   1. (10 points)  (hint: you can get this very easily from the three-bump equation)
   2. (10 points)  (might be a bit messy)



1. (10 points) Recall that the expansion of a normal sextupole is given by



so an offset in *x* will produce a linear slope in vs *y*. Use this to calculate the chromaticity in both planes (), in terms of , and sextupole strength . You may assume that the motion in the bend plane due to betatron oscillations is *small* compared to the motion due to dispersion.