**PHYS 488 Exercises Week 3**

**Task 1.1 Charged Particle Motion Through a Uniform Magnetic Field**

For this task it was required to analytically model the motion of a charged particle moving through a magnetic field, its position and momentum can be precisely calculated after a time interval **dT** using the following set of formulas:

First of all the simple calculations about the particle needed to be made using its momentum, mass and charge.

Initially the energy of the electron needed to be calculated relativistically:

, where **m** is the mass of an electron in MeV and **p** is the absolute momentum.

Therefore the Lorentz factor could be calculated using :

Using these basic formulas, the angle at which the electron would have rotated by in time **dT** could be calculated using:

The gamma factor is included to switch the equation from the electrons frame to the lab frame. Then the bending radius is then calculated using:

Next Unit vectors had to be calculated