Physics 2020 Assignment 6

1. Derive the expression for $(\nabla \times \vec{E})_y$.

2. Consider a field whose components are given by the following.

   $E_x = 6xy$, $E_y = 3x^2 - 3y^2$ $E_z = 0$

   a) By calculating the curl of the field, show it is a possible electrostatic field.

   b) Evaluate the divergence of this field.

3. Calculate the curl and divergence of each of the following vector fields.

   a) $F_x = x + y$ $F_y = -x + y$ $F_z = -z$

   b) $G_x = 2y$ $G_y = 2x + 3z$ $G_z = 3y$

   c) $H_x = x^2 - z^2$ $H_y = z$ $H_z = z \times z$

4. Consider $\vec{A}$, an arbitrary vector field with continuous derivatives. Show that

   $\nabla \cdot (\nabla \times \vec{A}) = 0$