Exercise 06

Please attempt all of the following problems before the due date. Your grade on this assignment will be calculated from the best two answers.

Problem 06.1
Find the integral curves of the vector field
\[ K_z = y \frac{\partial}{\partial x} - x \frac{\partial}{\partial y} \]
in the \( x, y \) plane.

Answer 06.1
Put all of your calculations here. When you have completed all of the problems, wrap the resulting file and e-mail it to me at rgowdy@saturn.vcu.edu.

Problem 06.2
Consider the vector fields
\[ K_x = z \frac{\partial}{\partial y} - y \frac{\partial}{\partial z}, \quad K_y = x \frac{\partial}{\partial z} - z \frac{\partial}{\partial x} \]
and calculate the commutator
\[ [K_x, K_y] \]

Answer 06.2
Put all of your calculations here. When you have completed all of the problems, wrap the resulting file and e-mail it to me at rgowdy@saturn.vcu.edu.

Problem 06.3
Given a vector field
\[ v = v_x \frac{\partial}{\partial x} + v_y \frac{\partial}{\partial y} + v_z \frac{\partial}{\partial z} \]
where \( v_x, v_y, v_z \) are functions of the coordinates, \( x, y, z \), calculate the commutator and Lie derivative
\[ \left[ \frac{\partial}{\partial x}, v \right] = L_{\partial/\partial x} v \]
Answer 06.3

Put all of your calculations here. When you have completed all of the problems, wrap the resulting file and e-mail it to me at rgowdy@saturn.vcu.edu.