Project 7: This project due (electronically by e-mail) by 11:59:59 Sunday Oct. 23, 2005

Part A

Develop a formula for the nabla operator in cylindrical coordinates. There is more than one way to do this development, but you should follow the procedure as presented in class. Start with the fact that in the Cartesian coordinate system nabla is presented as;

\[ \nabla = \left( \frac{\partial}{\partial x}, \frac{\partial}{\partial y}, \frac{\partial}{\partial z} \right) \]

or, if you like the vector equation short hand version;

\[ \nabla = \sum_i \delta_i \left( \frac{\partial}{\partial x_i} \right) \]

where \( x_i \) refers to any of the possible reference axis values (in this case; x, y and z)

and \( \delta_i \) refers to any of the possible reference basis vectors (in this case; \( |i\rangle, |j\rangle \) and \( |k\rangle \))

Part B

Repeat the process but this time develop a formula for the nabla operator in spherical coordinates.