KFUPM
Department of Mathematics and Statistics

MATH 302-4
Quiz 4, Term 101
(To be submitted by Wednesday, December 01, 2010)

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Exercise 1. (1) Let F be the vector field defined by

$$F(x, y, z) = (yz^3)\mathbf{i} + (xy^2)\mathbf{j} + (y^2z)\mathbf{k}.$$

Compute Curl(F) and div(Curl(F)).

(2) Let G be the vector field defined by

$$G(x, y, z) = (x + e^x)\mathbf{i} + (y + y^3)\mathbf{j} + (z + e^z)\mathbf{k}.$$

Is there a vector field $H(x, y, z)$ such that $G = \text{Curl}(H)$?

Exercise 2. Using Green's Theorem, evaluate the following line integral

$$\oint_C 4xy^3dx + 7x^2y^2dy,$$

where C is the positively oriented path which is the boundary of the region in the first quadrant bounded by $x = 1$, $y = x^2$ and the x-axis.