Problem Set #10
Due: Wednesday, Apr. 19

1. Compute the curl and the divergence of the following vector fields. Also determine whether or not the vector is conservative. If it is conservative, find a function f such that $F = \nabla f$.

(a) $F(x, y, z) =< 2xy, x^2 + 2yz, , y^2 >$.

(b) $F(x, y, z) =< x^2yz, xy^2z, , xyz^2 >$.

2. Evaluate the following line integrals.

(a) $\int_C x \, ds$ where C is given by $x = \cos(t)$, $y = \sin(t)$, $z = t$, $0 \le t \le \pi$.

(b) $\int_C F \cdot dr$ where $F =< 2xy, x^2 + 2yz, , y^2 >$ and C is given by $r(t) = (e^t \cos(\pi t), e^t \sin(\pi t), e^t)$ where $0 \le t \le 1$. (You can use the result in problem 1.)