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 \( x = \cos(t), y = \sin(t), z = t, \ 0 \leq t \leq \pi \).
   (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 \( 0 \leq t \leq 1 \). (You can use the result in problem 1.)