Math 233 Calculus 3 Spring 13 Practice questions

(1) Find parameterizations for
   (a) the unit disc $x^2 + y^2 \leq 1$ in the xy-plane.
   (b) the unit circle $x^2 + y^2 = 1$ in the xy-plane.
   (c) the intersection of the plane $x + 2y + z = 4$ with the solid cylinder $x^2 + y^2 \leq 1$.
   (d) the intersection of the plane $x + 2y + z = 4$ with the cylindrical surface $x^2 + y^2 = 1$.
   (e) the vertical surface of the cylinder $x^2 + y^2 = 1$ above $z = 0$ and below $x + 2y + z = 4$.

(2) Let $\mathbf{F} = \langle z, x, y \rangle$.
   (a) Verify Stokes' theorem for the surface consisting of the vertical portion of the cylinder $x^2 + y^2 = 1$, with $0 \leq z \leq 4 - x - 2y$, and the slanted top $x^2 + y^2 \leq 1$ with $x + 2y + z = 4$.
   (b) Verify Stokes' theorem for the surface consisting of the vertical portion of the cylinder $x^2 + y^2 = 1$, with $0 \leq z \leq 4 - x - 2y$, and the horizontal disc $x^2 + y^2 \leq 1$ with $z = 0$.
   (c) Verify the divergence theorem for $\mathbf{F}$ and the solid region $x^2 + y^2 \leq 1$, with $0 \leq z \leq 4 - x - 2y$.