Homework Section 16.4

1. Consider the line integral $\int_C x^2 y\,dx + xy^3\,dy$, where C is the triangle with vertices (0,0), (1,0), and (1,2):

   a) Evaluate the line integral directly.

   b) Evaluate the line integral using Green's Theorem (Note how much easier this is!!!).

2. Use Green's Theorem to evaluate the line integral along *C*, which is a positively oriented curve:

   a) $\int_C 2ye^x\,dx + e^x\,dy$, C is the square with sides $x = 0$, $x = 1$, $y = 0$, and $y = 1$.

   b) $\int_C (2y + \cos x^2)\,dx + (x + e^{\sqrt{y}})\,dy$, C is the boundary of the region enclosed by the parabolas $y = x^2$ and $x = y^2$.

   c) $\int_C (x + y)\,dx + (xy)\,dy$, C is the boundary of the region lying between the graphs of $x^2 + y^2 = 1$ and $x^2 + y^2 = 4$

3. Use Green's Theorem to find the work done by the force field $\mathbf{F}(x, y) = x^2 y\mathbf{i} + y(x + y)\mathbf{j}$ in moving a particle from (0, 1) along the *y*-axis to to the origin, then along the *x*-axis to (1,0), and then along the straight line segment back to (0, 1).

4. Use a line integral to find the area of the region bounded by the graphs of $y = 2x + 1$ and $y = 4 - x^2$.