1. Use Green's Theorem to evaluate the line integral along the given positively oriented curve.

$$\int_C \cos y dx + x^2 \sin y dy,$$

where C is the rectangle with vertices $(0,0)$, $(5,0)$, $(5,2)$, and $(0,2)$.

2. Use Green's Theorem to evaluate $\int_C \mathbf{F} \cdot d\mathbf{r}$.

$$\mathbf{F}(x,y) = \langle e^{-x} + y^2, e^{-y} + x^2 \rangle,$$

C consists of the arc of the curve $y = \cos x$ from $(-\pi/2, 0)$ to $(\pi/2, 0)$ and the line segment from $(\pi/2, 0)$ to $(-\pi/2, 0)$.

3. Let D be a region bounded by a simple closed path C in the xy-plane. Use Green's Theorem to prove that the coordinates of the centroid $(\bar{x}, \bar{y})$ of D are

$$\bar{x} = \frac{1}{2A} \oint_C x^2 dy \qquad \bar{y} = -\frac{1}{2A} \oint_C y^2 dx$$

where A is the area of D.

4. Find the curl and the divergence of the vector field.

$$\mathbf{F}(x,y,z) = e^{xy}\sin z\mathbf{j} + y\tan^{-1}(x/z)\mathbf{k}$$

5. Determine whether or not the vector field is conservative. If it is conservative, find a function f such that $\mathbf{F} = \nabla f$.

$$\mathbf{F}(x,y,z) = e^{yz}\mathbf{i} + xze^{yz}\mathbf{j} + xye^{yz}\mathbf{k}$$

$$\mathbf{F}(x,y,z) = \mathbf{i} + \sin z\mathbf{j} + y\cos z\mathbf{k}$$

Course Homework due Apr 30, Wed.

Apr 21, Mon. : **16.6** 13-18, 19, 21, 37, 41, 43
Apr 23, Wed. : **Midterm #2**
Apr 25, Fri. : **16.7** 5, 7, 9, 11, 13, 15, 17