1) Evaluate the line integral $\oint_C xy\,dx + x^2y^3\,dy$ where C is the triangle with vertices $(0,\ 0)$, $(1,\ 0)$, $(1,\ 2)$ by two methods:

   a) Directly.

   b) Using Green's Theorem.

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

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

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

4) $\int_C xe^{-2x}\,dx + \left(x^4 + 2x^2y^2\right)dy$ where C is the boundary of the region between the circles $x^2 + y^2 = 1$ and $x^2 + y^2 = 4$.

5) $\int_C 2\arctan\frac{y}{x}\,dx + \ln(x^2 + y^2)\,dy$ where $C:\ \ x = 4 + 2\cos\theta,\ \ y = 4 + \sin\theta$.

Use Green's Theorem to evaluate $\int_C \vec{\mathbf{F}} \cdot d\vec{\mathbf{r}}$. (Check the orientation of the curve before applying the theorem.)

6) $\vec{\mathbf{F}}(x, y) = \left\langle y^2 \cos x,\ x^2 + 2y\sin x \right\rangle$ where C is the triangle from $(0, 0)$ to $(2, 6)$ to $(2, 0)$ to $(0, 0)$.

7) $\vec{\mathbf{F}}(x, y) = (3x^2 + y)\,\mathbf{i} + 4xy^2\,\mathbf{j}$ where C is the boundary of the region lying between the graphs of $y = \sqrt{x}$, $y = 0$ and $x = 9$.

Use a line integral to find the area of the region R.

8) Region bounded by the graphs of $x^2 + y^2 = a^2$

9) Triangle bounded by the graphs of $x = 0$, $3x - 2y = 0$ and $x + 2y = 8$.

10) Region bounded by the graphs of $y = 5x - 3$ and $y = x^2 + 1$.