(Easier) Practice Quiz 8 Calc 3 11/12/2004

1. Compute $\int_C \left\langle x^2 + y^2, -xy^2 \right\rangle \cdot d\vec{r}$ for C the positively oriented rectangle having vertices (0, 0) (1, 0), (1, 5), and (0, 5).

By Greene's Theorem the integral is equal to $\int_0^1 \int_0^5 \left(-y^2 - 2y\right) dy dx = -\frac{200}{3}$.

(Harder) Practice Quiz 8 Calc 3 11/12/2004

1. Compute $\int_C \vec{F} \cdot d\vec{r}$ for the vector field $\vec{F}(x,y) = \langle -x^2 y, xy^2 \rangle$ where C is the boundary of the region in the first quadrant between a circle of radius 1 and a circle of radius 2.

By Greene's Theorem (and recognizing that polar coordinates are much more natural for this region) the integral is equal to $\iint_D \left(y^2 + x^2 \right) dA = \int_0^{\pi/2} \int_1^2 r^2 \cdot r \, dr d\theta = \frac{15\pi}{8}$.