

Math 280 Section C1 Quiz 8

March 30, 2001

Problem 1.

Let C be the boundary of the triangle in xy -plane with vertices $(0, 0)$, $(1, 0)$ and $(1, 1)$.

Compute the following line integral:

$$\oint_C y^2 dx + x^2 dy$$

Solution.

Since $P = y^2$ and $Q = x^2$, by Green's Theorem we have:

$$\begin{aligned} \oint_C y^2 dx + x^2 dy &= \int_0^1 \left(\int_0^x 2x - 2y dy \right) dx = \int_0^1 [2xy - y^2]_{y=0}^{y=x} dx = \\ &= \int_0^1 2x^2 - x^2 dx = \int_0^1 x^2 dx = \left[\frac{x^3}{3} \right]_0^1 = \frac{1}{3}. \end{aligned}$$