

Math 5B - Weekly quiz VIII
05/27/2010

NAME: _____

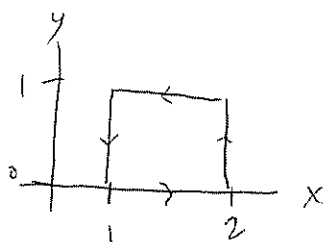
Grade: / 3

Use Green's Theorem to evaluate the line integral $\int_C xy^2 dx + 3x^2y dy$ over the positively oriented square with sides $x = 1$, $x = 2$, $y = 0$, $y = 1$

Green's Thm: $\int_C P dx + Q dy = \iint_D \frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} dA$

So if we let $P = xy^2$, $Q = 3x^2y$ then

$$\int_C xy^2 dx + 3x^2y dy = \iint_D \frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} dA$$



$$= \int_0^1 \int_1^2 (6xy - 2xy) dx dy$$

$$= \int_0^1 \int_1^2 4xy dx dy$$

$$= \int_0^1 2x^2y \Big|_1^2 dy$$

$$= \int_0^1 8y - 2y dy$$

$$= \int_0^1 6y dy$$

$$= 3y^2 \Big|_0^1 = \boxed{3}$$