

Name: _____

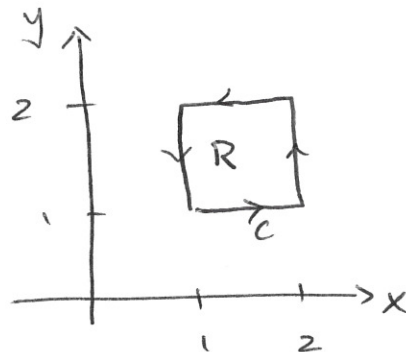
Math 2030, Winter 2011, Quiz 14
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Let R be the rectangle $1 \leq x \leq 2$, $1 \leq y \leq 2$, and let C be its boundary. Use Green's theorem to evaluate the line integrals

1. $\int_C x^n dx$

2. $\int_C x^n dy$

where n is any positive integer.



1.

$$\int_C x^n dx = \iint_R 0 dA = 0$$

$$Q = 0$$
$$P = x^n$$

$$2. \int_C x^n dy = \iint_R nx^{n-1} dA = \int_1^2 \int_1^2 nx^{n-1} dx dy$$

$$Q = x^n$$
$$P = 0$$

$$= \int_1^2 [x^n \Big|_1^2] dy$$

$$= (2-1)(2^n-1)$$

$$= 2^n - 1$$