

## Quiz 11 Calculus III Fall 2015

Names:.....

Solve the following problems. Each problem is worth 5 points.

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**Q1.** Let  $\mathbf{F}(x, y) = y\mathbf{i} + x\mathbf{j}$ , and let  $C$  be the straight line segment from  $(4, 6)$  to  $(1, 0)$ .

(b) Check that  $\mathbf{F}$  is a **conservative** vector field.

(b) Find a function  $f(x, y)$  such that  $\mathbf{F}(x, y) = \nabla f(x, y)$ .

(b) Use part (b) to compute  $\int_C \mathbf{F} \cdot d\mathbf{r}$ . (Hint: Fundamental Theorem for line integral).

**Q2.**

1. Use Green's Theorem to compute

$$I = \int_C xy \, dx + x^2 \, dy$$

where  $C$  is the boundary of the square with vertices  $(0,0)$ ,  $(1,0)$ ,  $(1,1)$  and  $(0,1)$  in the counterclockwise direction.

2. Use Green's Theorem to compute the **area** of the ellipse:  $\frac{x^2}{4} + \frac{y^2}{9} = 1$ .