NAME: _____ **Panther ID:** _____

Quiz 6 - Take home - Due Tue. April 13 MAC 2313 - Spring 2010

1. Let $\mathbf{F}(x,y) = \frac{y}{x^2+y^2}\mathbf{i} - \frac{x}{x^2+y^2}\mathbf{j}$. Note that the vector field is not defined at $(0,0)$.

(a) (6 pts) Show that curl $\mathbf{F} = \mathbf{0}$.

(b) (7 pts) Part (a) implies that on simply connected regions not containing $(0,0)$ the field is conservative. Find a potential $\phi(x,y)$ for the field on such regions.

(c) (7 pts) Show that

$$\int_{C_1} \mathbf{F}\cdot d\mathbf{r} \neq \int_{C_2} \mathbf{F}\cdot d\mathbf{r}\ ,$$

where C_1 and C_2 are the semi-circular paths from $(1,0)$ to $(-1,0)$ given by:
C_1: $x = \cos t,\ \ y = \sin t,\quad 0 \le t \le \pi$;
C_2: $x = \cos t,\ \ y = -\sin t,\quad 0 \le t \le \pi$.

(d) (4 pts bonus) Can you explain why parts (b) and (c) are not contradictory?