

MATH 311 – CALCULUS 3
Spring 2006
QUIZ 11

NAME _____

1. Let C be the circle $x^2 + y^2 = 25$ parametrized by $\langle 5 \cos t, 5 \sin t \rangle$ with $0 \leq t \leq 4\pi$. Evaluate

$$\int_C -y \, dx + x \, dy.$$

2. Given that the vector field $\mathbf{F}(x, y) = \langle 2x + y^2, 2xy - y^3 \rangle$ is conservative, find a potential function for $\mathbf{F}$.

3. Compute the work done as a force $\mathbf{F}(x, y) = \langle 2x + y^2, 2xy - y^3 \rangle$ moves a particle along the ellipse $9x^2 + 4y^2 = 36$ in the counterclockwise direction from $(2, 0)$ to $(0, -3)$. (Hint: Note that $\mathbf{F}$ is conservative.)

4. A thin wire has the shape of the graph C of $y = x^2$ from $(0, 0)$ to $(2, 4)$. The density of the wire at a point (x, y) along C is given by $\rho(x, y) = 8x$. Compute the mass of the wire.