

Quiz 10 - Math 53
November 20, 2008

Name _____

Let C be the curve parameterized by $\mathbf{r}(t) = \langle t, t^2 \rangle$, $-1 \leq t \leq 1$, and let B be the curve parameterized by $\mathbf{r}(t) = \langle t, 1 \rangle$, $-1 \leq t \leq 1$. Let $\mathbf{F} = \langle y, \sin^8(y^2) - 2x \rangle$.

1a)[3pts] Set up an integral to compute $\int_C \mathbf{F} \cdot d\mathbf{r}$. *You don't have to evaluate the integral, but it should be in a form so that you could plug it into a computer integration program or try to look it up on a table of integrals.*

1b)[3pts] Use Green's theorem to find a relationship between $\int_C \mathbf{F} \cdot d\mathbf{r}$ and $\int_B \mathbf{F} \cdot d\mathbf{r}$ (be careful to get the signs right). Use this to compute $\int_C \mathbf{F} \cdot d\mathbf{r}$.

2)[3pts] Consider the vector field $\mathbf{F} = \langle x + y, y^2 + \sin z, z^3 \rangle$. Compute $\nabla \times \mathbf{F}$ and $\nabla \cdot \mathbf{F}$. Could \mathbf{F} be of the form ∇f for some function f ? Could \mathbf{F} be of the form $\nabla \times \mathbf{G}$ for some vector field \mathbf{G} ? *Be sure you explain your reasoning.*