Math 392 Formula Check after quiz 7
March 13, 2019

Name: ANSWERS

Instructions: Complete the following statements/formulas.

1. Define the following:

(a) $\int_C f(x,y)\, ds = \int_a^b f(x(t),y(t)) \sqrt{(x'(t))^2 + (y'(t))^2}\, dt$

(b) $\int_C \vec{F} \cdot d\vec{r} = \int_a^b \vec{F}(\vec{r}(t)) \cdot \vec{r}\,'(t)\, dt$

(c) $\int_C f(x,y)\, dx = \int_a^b f(x(t),y(t))\, x'(t)\, dt$

(where C is a smooth curve parametrized by $\vec{r}(t) =< x(t), y(t) >$. No shorthand, flesh out full definition.)

2. State the equation in the fundamental theorem for line integrals: $\int_C \nabla f \cdot d\vec{r} = f(\vec{r}(b)) - f(\vec{r}(a))$

3. State the equation in Green's Theorem: $\int_C P\,dx + Q\,dy = \iint_D Q_x - P_y \, dA$

4. What does it mean to say "$\vec{F}$ is conservative"? $\vec{F} = \nabla f$ for some scalar function f.

5. Let $\vec{F} =< P(x,y), Q(x,y) >$ be defined on an open, simply connected domain D. Suppose P and Q have continuous first partial derivatives on D. What equation would you use to check if $\vec{F}$ is conservative? $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$

6. Let $\vec{F} =< P(x,y), Q(x,y), R(x,y) >$ be defined on an open, simply connected domain D. Suppose P, Q, and R have continuous first partial derivatives on D. What equation would you use to check if $\vec{F}$ is conservative? $\text{curl}\,\vec{F} = \vec{0}$