Math 392 Quiz 3B
February 13, 2018

Name: ANSWERS

Instructions: No calculators! Answer all problems in the space provided! Do your rough work on scrap paper.

1. Setup an integral to find the length of the curve parametrized by $x = tsint$, $y = te^t$ for $0 \le t \le 1$.

$L = \int_0^1 \sqrt{\sin^2 t + 2t\sin t\cos t + t^2\cos^2 t + (t+1)^2 e^{2t}}\, dt$

2. Define the following:

(a) $\int_C f(x,y)\, ds =$ $\int_a^b f(x(t), y(t)) \|\vec{r}\,'(t)\|\, dt$

(where C is a smooth curve parametrized by $\vec{r}(t)$)

(b) $\nabla f(x,y,z) =$ $\langle f_x, f_y, f_z \rangle$

3. Let $f = xe^{y/z} - x^2yz$, find $\nabla f =$ $\left\langle e^{y/z} - 2xyz,\ \frac{x}{z}e^{y/z} - x^2z,\ -\frac{xy}{z^2}e^{y/z} - x^2y \right\rangle$

4. Let C be the line segment from (3,2) to (2,3), compute $\int_C xy\, ds$

Integral set-up: $\sqrt{2}\int_0^1 (3-t)(2+t)\,dt$ Answer: $\frac{37\sqrt{2}}{6}$

Bonus:

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