

Math 392 Quiz 3A  
February 11, 2019

Name: \_\_\_\_\_

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

1. Define the following:

(a)  $\nabla f(x, y, z) =$  \_\_\_\_\_

(b)  $\int_C f(x, y) ds =$  \_\_\_\_\_

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

2. Setup an integral to find the length of the curve parametrized by  $x = 2e^t \cos t, y = 2e^t \sin t$  for  $0 \leq t \leq \pi$ .

$L =$  \_\_\_\_\_ (Simplify the integrand, but do not evaluate the integral)

3. Evaluate the above integral:  $L =$  \_\_\_\_\_

4. Let  $f = z \sin^2(xy)$ , find  $\nabla f =$  \_\_\_\_\_

5. Let  $C$  be the line segment from  $(1,1)$  to  $(2,2)$ , compute  $\int_C 3x^2 ds$

Integral set-up: \_\_\_\_\_ Answer: \_\_\_\_\_

**Bonus:**

1. Compute  $\int_C 2x ds$  where  $C$  consists of the quarter circle  $x^2 + y^2 = 1$  in the third quadrant, traversed counter-clockwise, followed by the line segment from  $(0,-1)$  to  $(0,-2)$ .

Integral(s) set-up: \_\_\_\_\_ Answer: \_\_\_\_\_

2. Define  $\int_C \vec{F} \cdot d\vec{r} =$  \_\_\_\_\_

State the meanings of the symbols in the above: \_\_\_\_\_

\_\_\_\_\_  
(Problem 2 is all-or-nothing)

3. Define  $\int_C f(x, y) dx =$  \_\_\_\_\_