

MATH 392 Quiz 2B

June 11, 2019

Name: _____

Instructions: No calculators! Use your own scrap paper and write your answers in the space provided.

1. Let $\vec{r}(t) = \langle x(t), y(t), z(t) \rangle$, $f(x, y, z)$ be a scalar function, and $P(x_1, y_1)$ and $Q(x_2, y_2)$ be points in \mathbb{R}^2 . Complete the following rules/formulas with vector functions (C is a smooth curve parametrized by $\vec{r}(t)$ with $a \leq t \leq b$, while s is the length of $\vec{r}(t)$). No shorthand, flesh out the full definitions.).

(a) $\vec{r}'(t) =$ _____

(b) $s =$ _____

(c) Line segment $\overrightarrow{PQ} =$ _____ (include limits)

(d) $\int_C f(x, y, z) ds =$ _____

2. (a) (2 points) Sketch the region bounded by $z = 8 - x^2 - y^2$ and $z = x^2 + y^2$.

(b) Parametrize the curve of intersection, $\vec{r}_i(t)$, of the above two surfaces. Set up the limits so that the curve is traversed once.

$\vec{r}_i(t) =$ _____ Limits: _____ $\leq t \leq$ _____

3. Setup an integral to find the length of the curve parametrized by $x = 3e^\theta \cos \theta$, $y = 3e^\theta \sin \theta$ for $0 \leq \theta \leq \frac{\pi}{4}$.

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

4. Compute $\int_C x ds$ where C consists of the quarter circle $x^2 + y^2 = 4$ in the fourth quadrant, traversed clockwise, followed by the line segment from $(0, -1)$ to $(0, -2)$.

Integral(s) set-up: _____ Answer: _____

Bonus:

1. Define $\int_C \vec{F} \cdot d\vec{r} =$ _____