

Math 392 Quiz 8B

March 18, 2019

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

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

1. Define the following:

$$(a) \int_C f(x, y) dy = \underline{\hspace{10cm}}$$

$$(b) \int_C \vec{F} \cdot d\vec{r} = \underline{\hspace{10cm}}$$

$$(c) \int_C f(x, y) ds = \underline{\hspace{10cm}}$$

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

2. What does it mean to say " $\vec{F}$  is conservative"? \_\_\_\_\_

3. State the equation in Green's Theorem: \_\_\_\_\_

4. State the equation in the fundamental theorem for line integrals: \_\_\_\_\_

5. What does it mean to say " $\vec{G}$  is a vector potential of  $\vec{F}$ "? \_\_\_\_\_

6. Let  $\vec{F} = \langle P(x, y), Q(x, y) \rangle$  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? \_\_\_\_\_

7. Let  $\vec{F} = \langle P(x, y), Q(x, y), R(x, y) \rangle$  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? \_\_\_\_\_

8. Let  $\vec{F} = \langle yz - x^3, y^2 + xz, xy - z^3 \rangle$ :

(a) Compute  $\text{curl} \vec{F} = \underline{\hspace{10cm}}$

(b) Compute  $\int_C \vec{F} \cdot d\vec{r}$ , where  $C$  is the negatively oriented curve in the  $yz$ -plane given by the line segment from  $(-1, 0, 1)$  to  $(1, 0, 1)$ , followed by the line segment from  $(1, 0, 1)$  to the origin, followed by another line segment from the origin to  $(-1, 0, 1)$ .  $\int_C \vec{F} \cdot d\vec{r} = \underline{\hspace{10cm}}$

(c) Justify/show your work for part (b). Begin your answer below, you may use the reverse side of this sheet if necessary.