


Math 392 Quiz 3B

June 18, 2019

Name: _____

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

1. What does it mean to say " \vec{F} is conservative"? _____
2. Define $\int_C f(x, y, z) dy =$ _____
3. Define $\int_C \vec{F} \cdot d\vec{r} =$ _____
4. Let \vec{F} be a vector field whose components have continuous first and second partials. What equation would you check to determine if \vec{F} is conservative in the following cases?
 - (a) $\vec{F} = \langle P(x, y, z), Q(x, y, z), R(x, y, z) \rangle$; equation to check: _____
 - (b) $\vec{F} = \langle P(x, y), Q(x, y) \rangle$; equation to check: _____
5. State the equation in the fundamental theorem for line integrals: _____
6. State the equation in Green's Theorem: _____
7. For us, what is the most important interpretation of $\int_C \vec{F} \cdot d\vec{r}$? _____
8. Find a scalar potential f for the function $\vec{F} = \langle yz^2, \tan^{-1} z + xz^2, \frac{y}{1+z^2} + 2xyz \rangle$:
 $f =$ _____
9. Let D be the region in the plane bounded by $x = y$ and $y = x^2 - x$. Let C be the positively oriented boundary of D .
Set-up integrals to compute (where a sum of integrals may be necessary): $\int_C x^3 y^2 dx + \frac{1}{2} x^4 y dy$
 - (a) Line integral(s): _____
 - (b) Double integral(s): _____
 - (c) Sketch the region below and orient the curve C :


Bonus:

1. Define $\text{div } \vec{F}(x, y) =$ _____
2. If $\text{curl } \vec{F} = \vec{0}$, then \vec{F} is called _____; if $\text{div } \vec{F} = 0$, then \vec{F} is called _____
3. What does it mean to say " \vec{G} is a vector potential of \vec{F} "? _____