MATH 2242-090 — Spring 2016 — Dr. Clontz — Quiz 11

Name: Solutions

- Each quiz question is labeled with its worth toward your total quiz grade for the semester.
- On multiple choice problems, you do not need to show your work. No partial credit will be given.
- On full response problems, show all of your work and give a complete solution. When in doubt, don't skip any steps. Partial credit will be given at the discretion of the professor.
- This quiz is open notes and open book.
- This quiz is due at the end of class. Quizzes submitted over one minute late will be penalized by 50%.

1. (10 points) Evaluate $\int_C 3xy^2dx + xydy$ where C is the counter-clockwise oriented boundary of the rectangle $[0,2]\times[1,3]$. (Hint: Partial credit will not be given if you attempt to evaluate this directly; try to use a technique from Chapter 8.)

$$= \int_1^3\int_0^2 \frac{\partial F_2}{\partial x} - \frac{\partial F_1}{\partial y}\, dx\,dy$$

$$= \int_1^3\int_0^2 y - 6xy \, dx\,dy$$

$$= \int_1^3 \left[xy - 3x^2y\right]_0^2 dy$$

$$= \int_1^3 -10y\, dy$$

$$= \left[-5y^2\right]_1^3 = \boxed{-40}$$

2. (10 points) Evaluate $\int_C (3 \overset{f_x}{+} y, 4y \overset{f_y}{+} x)\cdot d\mathbf{s}$ where C is parameterized by $\mathbf{r}(t) = (2^t, \sin(\pi t))$ for $0 \le t \le 1$. (Hint: Partial credit will not be given if you attempt to evaluate this directly; try to use a technique from Chapter 8.)

$f_x = 3 + y$ $\qquad$ $f_y = 4y + x$

$f = 3x + xy + \phi$ $\qquad$ $f = 2y^2 + xy + \phi$ ✓

$$f = 3x + xy + 2y^2$$

$$= \left[3x + xy + 2y^2\right]_{r(0)}^{r(1)}$$

$$= \left[3x + xy + 2y^2\right]_{(1,0)}^{(2,0)}$$

$$= (6+0+0) - (3+0+0) = \boxed{3}$$