MATH 13, FALL '16

HOMEWORK 6

Due Wednesday, Oct 26, **by 3:00pm**

Write your answers neatly and clearly. Use complete sentences, and label any diagrams. List problems in numerical order and staple all pages together. Start each problem on a new page. Please show your work; no credit is given for solutions without work or justification.

Remember that you may discuss the problems with classmates, but all work should be your own. List the names of anybody with whom you discussed the problems at the top of the page.

1. Let C be the curve parametrized by $\boldsymbol{r}(t) = \langle t, \sqrt{t}, t^2 \rangle$ for $1 \leq t \leq 4$. Let $\boldsymbol{F} = \langle y+z, x+z, x+y \rangle$.

   a) Without using any results about conservative vector fields, calculate $\int_C \boldsymbol{F} \cdot d\boldsymbol{r}$.

   b) Now, calculate this integral again using results about conservative vector fields.

2. Evaluate the line integral

$$\int_C \left\langle 6y + \sin\left(x^2\right), 2x^2y + e^{y^2} \right\rangle \cdot d\boldsymbol{r},$$

   where C is the circle with radius 1 centered at the origin, oriented **clockwise**.

3. Evaluate the line integral of the vector field

$$\boldsymbol{F} = \left\langle 2y + \cos(x^2), x^2 + y^2 \right\rangle$$

   along the curve that follows the parabola $y = x^2$ from $(0,0)$ to $(1,1)$ and then travels along a straight line from $(1,1)$ to $(0,2)$. (*Hint:* Add a line to enclose a region, and think about how Green's Theorem can be applied.)

4. Let D be the triangular region with corners $(1,1)$, $(4,2)$, and $(2,3)$. Use Green's Theorem to calaculate the area of D.