

Math 215
Homework Set 8: §§17.3 – 17.4
Winter 2008

Most of the following problems are modified versions of the recommended homework problems from your text book *Multivariable Calculus* by James Stewart.

- 17.3b. Let $\mathbf{F} = \nabla f$ where $f(x, y) = \sin(2y - x)$. Find curves C_1 and C_2 that are not closed and which satisfy the equations

$$\int_{C_1} \mathbf{F} \cdot d\mathbf{r} = 0 \quad \int_{C_2} \mathbf{F} \cdot d\mathbf{r} = 1.$$

- 17.3c. Do Problem 11 of §17.3 in Stewart's *Multivariable Calculus*.

- 17.4a. Use Green's theorem to show that if D is a region bounded by a simple closed curve C , then the area of D is given by the formulas

$$\oint_C x \, dy,$$

$$\oint_C y \, dx,$$

or

$$1/2[\oint_C x \, dy - y \, dx].$$

(HINT: This is done on pages 1093–1094.)

- 17.4b. Note that if C is the line segment connecting the point (a, b) to the point (c, d) then,

$$\int_C x \, dy - y \, dx = ad - bc.$$

Show (using Green's theorem) that if (a, b) , (c, d) , and (e, f) are the vertices of a triangle, then the area of the triangle is given by the formula

$$1/2[(ad - cb) + (cf - ed) + (eb - af)].$$

- 17.4c. Generalize the above problem by doing Problem 21 of §17.4 in Stewart's *Multivariable Calculus*.