

## Problem Set for Week 8

The work handed in should be entirely your own. You can consult Stewart and/or the class notes but nothing else. To receive full credit, justify your answer in a clear and logical way. Due March 25.

**Reading.** This is the most important part of the homework: Read Sections 16.3–16.4 of the textbook carefully. Since we'll be having the second midterm soon after the Spring break, it is a good idea to start reviewing what we have covered from Chapter 15.

1. Section 16.4 Exercises 2, 10, 14, 21, 27.
2. Evaluate the integral  $\int_C \mathbf{F} \cdot d\mathbf{r}$ . Here  $\mathbf{F}$  is the field

$$\mathbf{F} = (\sin(x^2) + y)\mathbf{i} + (xy^2 + y^4)\mathbf{j},$$

and the curve  $C$  goes from  $(0, -1)$  to  $(0, 1)$  along the parabola  $x = 1 - y^2$ .

3. Evaluate the integral  $\oint_C \mathbf{F} \cdot d\mathbf{r}$  Here  $\mathbf{F}$  is the field

$$\mathbf{F} = \frac{-y}{x^2 + y^2}\mathbf{i} + \left(\frac{x}{x^2 + y^2} + x\right)\mathbf{j}.$$

The closed curve  $C$  goes from  $(-4, -12)$  to  $(4, -12)$  on a straight line, then back to  $(-4, -12)$  along the parabola  $y = 4 - x^2$ . Note that  $\mathbf{F}$  is not defined at the origin.