

Vector Calculus, Tutorial 1

September 2013

The following questions should be attempted

1. Consider the function $f(x, y) = \sin(x - y)$ defined on the plane \mathbf{R}^2 . Describe the level sets of this function using equations. Describe the graph of this function with equations and words or diagrams.

Evaluate the double integral

$$\int \int_{\mathbf{R}} \sin(x - y) dA, \quad \mathbf{R} = \left\{ (x, y) \mid 0 \leq x \leq \frac{\pi}{2}, \quad 0 \leq y \leq \frac{\pi}{2} \right\}$$

2. Find the volume of the solid that lies under the plane $4x + 6y - 2z + 15 = 0$ and above the rectangle

$$\mathbf{R} = \{ (x, y) \mid -1 \leq x \leq 2, \quad -1 \leq y \leq 1 \}$$

3. Evaluate the double integral $\int \int_{\mathbf{D}} x \cos(y) dA$ where \mathbf{D} is bounded by the lines $y = 0, x = 1$ and the curve $y = x^2$.