

# Math 2415

## Homework on 15.1

1. Estimate the volume of the solid that lies below the graph of  $z = f(x, y) = x^2 - 2y$  and above the rectangle  $[2, 6] \times [-1, 1]$ . Use a Riemann sum with 4 equal sized rectangles with  $\Delta x = 2$  and  $\Delta y = 1$  and evaluate  $f$  at the midpoints of the rectangles.
2.  $\int_0^1 \int_0^1 (xy)^2 \cos(x^3) dA$
3. Calculate the average value of  $f(x, y) = e^x \sin y$  over the rectangle where  $0 \leq x \leq 1$  and  $0 \leq y \leq \frac{\pi}{4}$ .
4. Calculate the volume of the solid bounded by the  $xz$ -plane, the  $yz$ -plane, the  $xy$ -plane, the planes  $x = 1$  and  $y = 1$  and the surface  $z = x^2 + y^4$ .
5. Let  $R$  be the diamond with vertices  $(0, \pm 1)$  and  $(\pm 1, 0)$ . Use the symmetry of this region to reduce the work required to calculate the following integrals.

(a)  $\iint_R x dA$

(b)  $\iint_R (x^2 + y^2) dA$