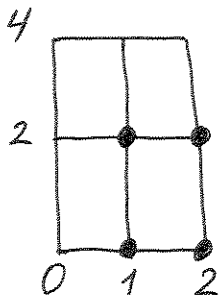


QUIZ 1 (MATH 32B)

(Thursday)

Problem 1. Estimate the volume of the solid that lies below the surface $z = x + 2y^2$ and above the rectangle $R = [0, 2] \times [0, 4]$ using a Riemann sum with $m = n = 2$ and choosing the sample points to be the lower right corners.



sample points : $(1, 0), (1, 2),$
 $(2, 0), (2, 2)$

$$\Delta A = 1 \cdot 2 = 2$$

$$\text{Volume} \approx \sum_{i=1}^2 \sum_{j=1}^2 f(x_i^*, y_j^*) \cdot \Delta A =$$

$$= (f(1, 0) + f(1, 2) + f(2, 0) + f(2, 2)) \cdot 2 =$$

$$= (1 + 3 + 2 + 10) \cdot 2 = 44.$$

Problem 2. Evaluate the double integral

$$\iint_D \frac{4y}{x^3+2} dx dy,$$

where $D = \{(x, y) \mid 0 \leq x \leq 1, 0 \leq y \leq 2x\}$.

$$\begin{aligned} I &= \iint_D \frac{4y}{x^3+2} dx dy = \int_0^1 \int_0^{2x} \frac{4y}{x^3+2} dy dx = \\ &= \int_0^1 \frac{4}{x^3+2} \left(\frac{y^2}{2} \Big|_0^{2x} \right) dx = \int_0^1 \frac{1}{x^3+2} 2(4x^2) dx = \\ &= 8 \int_0^1 \frac{x^2 dx}{x^3+2} = \frac{8}{3} \int_2^3 \frac{du}{u} = \frac{8}{3} \ln \frac{3}{2}. \end{aligned}$$

$$u = x^3 + 2$$

$$du = 3x^2 dx$$

$$u(0) = 2$$

$$u(1) = 3$$