

Yash Khangura "Quiz" for Lecture 12

Section 24

1. Calculate the iterated integral

$$\int_1^2 \int_{-1}^1 (x + y^2) dx dy = \int_1^2 \left. \frac{x^2}{2} + xy^2 \right|_{-1}^1 dy = \int_1^2 (\frac{1}{2} + y^2) - (\frac{1}{2} - y^2) dy$$

$$= \int_1^2 2y^2 dy = \frac{2y^3}{3} \Big|_1^2 = \frac{16}{3} - \frac{2}{3} = \frac{14}{3}$$

2. Calculate the double integral

$$\iint_R \frac{x^2 y}{x^3 + 1} dA, R = \{(x, y) \mid 0 \leq x \leq 1, -1 \leq y \leq 1\}$$

$$\int_{-1}^1 \int_0^1 \frac{x^2 y}{x^3 + 1} dx dy = \left(\int_{-1}^1 y \right) \cdot \left(\frac{1}{3} \ln(x^3 + 1) \Big|_0^1 \right) = \int_{-1}^1 y \cdot \frac{\ln 2}{3} dy = \frac{y^2}{2} \cdot \frac{\ln 2}{3} \Big|_{-1}^1$$

$$= \frac{\ln 2}{6} - \frac{\ln 2}{6} = 0$$