

Quiz for Lecture 12

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Section 22

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1. Calculate the iterated integral

$$\int_1^2 \int_{-1}^1 (x+y^2) dx dy$$

step 1:  $\int_{-1}^1 (x+y^2) dx$

$$= \left( \frac{1}{2}x^2 + y^2x \right) \Big|_{-1}^1$$

$$= \left( \frac{1}{2}x^2 + y^2x \right) \Big|_{-1}^1 - \left( \frac{1}{2}x^2 + y^2x \right) \Big|_{-1}^{-1}$$

$$= \frac{1}{2} + y^2 - \left( \frac{1}{2} + y^2 \right)$$

$$= 2y^2$$

step 2:  $\int_1^2 2y^2 dy$

$$= \frac{2}{3}y^3 \Big|_1^2$$

$$= \left( \frac{2}{3}x^3 - \frac{2}{3}x^3 \right)$$

$$= \frac{16}{3} - \frac{2}{3}$$

$$= \frac{14}{3}$$

Ans:  $\frac{14}{3}$

z1 Calculate the double integral

$$\iint_R \frac{x^2 y}{x^2 + 1} dA$$

$$R = \{(x, y) \mid 0 \leq x \leq 1, -1 \leq y \leq 1\}$$

step 1:  $\int_0^1 \int_{-1}^1 \frac{x^2 y}{x^2 + 1} dy dx$

step 2:  $\Rightarrow \int_{-1}^1 \frac{x^2 y}{x^2 + 1} dy$   
 $= \frac{x^2}{x^2 + 1} y^2 \cdot \frac{1}{2} \Big|_{-1}^1$   
 $= \frac{x^2}{x^2 + 1} \left( \frac{1}{2} x (1 - (-1)^2) \right)$   
 $= \frac{x^2}{x^2 + 1} \left( \frac{1}{2} x \cdot 0 \right)$   
 $= 0$

step 3:  $\int_0^1 dx$   
 $= x \Big|_0^1$   
 $= 1 - 0$   
 $= 1$

Ans: 1.