

"QUIZ" for Lecture 14

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E-MAIL SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com (Attachment: q14FirstLast.pdf) ASAP BUT NO LATER THAN Oct. 26, 8:00pm

1. Evaluate the iterated integral

$$\int_0^1 \int_x^{3x} \int_0^y x^2 y z \, dz \, dy \, dx = 10/7$$

$$\begin{aligned} \int_0^y x^2 y z \, dz &\rightarrow x^2 y \int_0^y z \, dz \rightarrow \frac{z^2}{2} \Big|_0^y \rightarrow x^2 y \frac{y^2}{2} \\ \int_x^{3x} x^2 y^3 \cdot \frac{1}{2} \, dy &\rightarrow \frac{1}{2} x^2 \int_x^{3x} y^3 \, dy \rightarrow \frac{y^4}{4} \Big|_x^{3x} \rightarrow \frac{81x^4}{4} - \frac{x^4}{4} = \frac{80x^4}{4} \\ \int_0^1 \frac{1}{2} x^2 \cdot 20x^4 \, dx &\rightarrow 10 \int_0^1 x^6 \, dx \rightarrow \frac{x^7}{7} \Big|_0^1 \rightarrow \frac{1}{7} \cdot 10 = 10/7 \end{aligned}$$

2. Evaluate the triple integral

$$\iiint_E yz \ln(x^5) \, dV$$

where

$$E = \{(x, y, z) \mid 0 \leq x \leq 1, 0 \leq y \leq x, 2x \leq z \leq 3x\}$$

$$= -1/4$$

$$\begin{aligned} \int_{2x}^{3x} y \cdot z \cdot \ln(x^5) \, dz &\rightarrow \ln(x^5) \cdot y \int_{2x}^{3x} z \, dz \rightarrow \frac{z^2}{2} \Big|_{2x}^{3x} \rightarrow \frac{5x^2}{2} \\ \int_0^x \ln(x^5) y \cdot \frac{5x^2}{2} \, dy &\rightarrow \ln(x^5) \cdot \frac{5x^2}{2} \int_0^x y \, dy \rightarrow \frac{y^2}{2} \Big|_0^x \rightarrow \frac{x^2}{2} \\ \int_0^1 \ln(x^5) \cdot \frac{5x^2}{2} \cdot \frac{x^2}{2} \, dx &\rightarrow \frac{5}{4} \int_0^1 \ln(x^5) \cdot x^4 \, dx \rightarrow \frac{1}{4} \int_0^1 \ln(u) \, du \rightarrow \frac{1}{4} (\ln(1) - 1) \\ &= -1/4 \end{aligned}$$