

"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

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

$$\int_0^y x^2 y z \, dz = \frac{x^2 y z^2}{2} \Big|_0^y = \frac{x^2 y (y)^2}{2} = \frac{x^2 y^3}{2}$$

$$\int_x^{3x} \frac{x^2 y^3}{2} \, dy = \frac{x^2 y^4}{8} \Big|_x^{3x} = x^2 \frac{(3x)^4}{8} = \frac{16x^2 \cdot x^4}{8} = 2x^6$$

$$\int_0^1 2x^6 \, dx = \frac{2x^7}{7} \Big|_0^1 = \frac{2(1)^7}{7} = \boxed{\frac{2}{7}}$$

2. Evaluate the triple integral

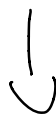
$$\iiint_E yz \ln(x^5) \, dV$$

where

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

$$\int_0^1 \int_0^x \int_{2x}^{3x} yz \ln(x^5) \, dz \, dy \, dx$$

$$\int_{2x}^{3x} yz \ln(x^5) \, dz = \frac{y^2 z \ln(x^5)}{2} \Big|_{2x}^{3x} = \frac{x^2 z \ln(x^5)}{2}$$



$$\int_0^x \frac{x^2 z^2 \ln(x^5)}{2} dz = \frac{x^2 z^2 \ln(x^5)}{4} \Big|_0^x = \frac{x^2 x^2 \ln(x^5)}{4}$$

$$= \frac{x^4 \ln(x^5)}{4}$$

$$\frac{1}{4} \cdot \int_0^1 x^4 \ln(x^5) dx \quad \begin{array}{l} u = x^5 \\ du = 5x^4 dx \end{array}$$

$$\frac{1}{4} \cdot \int_0^1 x^4 \cdot \ln(u) \cdot \frac{du}{5x^4} = \frac{1}{20} \cdot \int \ln(u) \cdot du$$

$$= \frac{1}{20} \cdot u \cdot \ln|u| = \frac{1}{20} \cdot x^5 \cdot \ln|x^5| \Big|_0^1$$

$$\frac{1}{20} \cdot 1^5 \cdot \ln|1^5| = \boxed{0}$$