"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

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

$$\int_0^y x^2 yz \, dz = \left| \frac{x^2 y z^2}{2} \right|_0^y = \left(\frac{x^2 y^3}{2} \right) - 0$$

$$\int_x^{3x} \frac{x^2 y^3}{2} \, dy = \left| \frac{x^2 y^4}{8} \right|_x^{3x} = \left(\frac{81x^6}{8} \right) - \left(\frac{x^6}{8} \right) = 10x^6$$

$$\int_0^1 10x^6 \, dx = \left| \frac{10x^7}{7} \right|_0^1 = \boxed{\frac{10}{7}}$$

2. Evaluate the triple integral

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

where

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

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

$$\int_{2x}^{3x} yz \ln(x^5) \, dz = \left| \frac{yz^2 \ln(x^5)}{2} \right|_{2x}^{3x} = \frac{9x^2 y \ln(x^5)}{2} - \frac{4x^2 y \ln(x^5)}{2} = \frac{5x^2 y \ln(x^5)}{2}$$

$$\int_0^x \frac{5x^2 y \ln(x^5)}{2} \, dy = \left| \frac{5x^2 y^2 \ln(x^5)}{4} \right|_0^x = \frac{5x^4 \ln(x^5)}{4} - 0$$

$$\int_0^1 \frac{5x^4 \ln(x^5)}{4} \, dx = \frac{5}{4} \left| x^5 \ln(x) - \frac{x^5}{5} \right|_0^1 = \boxed{-\frac{1}{4}}$$