"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

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

① $\int_0^4 x^2 yz \, dz$

$= \frac{x^2 y z^2}{2} \Big|_0^4 = 8x^2 y$

② $\int_x^{3x} 8x^2 y \, dy = \frac{8x^2 y^2}{2} \Big|_x^{3x} = [4x^2 9x^2 - 4x^2 x^2] = 36x^4 - 4x^4 = 32x^4$

③ $\int_0^1 32x^4 \, dx = 32 \int_0^1 x^4 dx = \frac{32x^5}{5} \Big|_0^1 = \frac{32}{5}$

2. Evaluate the triple integral

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

where

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

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

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

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

③ $\int_0^1 \frac{5x^4 \ln(x^5)}{4} = \frac{x^5 (5 \ln x - 1)}{4} \Big|_0^1 = \frac{-1}{4}$

$u = x^5$