"QUIZ" for Lecture 14

NAME: (print!) Joe Barr **Section:** 24

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

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

$$① \int_0^y x^2 yz \, dz = x^2 y z^2 \Big|_0^y = x^2 y^3$$

$$② \int_x^{3x} x^2 y^3 \, dy = \frac{x^2 y^4}{4} \Big|_x^{3x} = \frac{x^2 (3x)^4}{4} - \frac{x^6}{4} = \frac{80x^6}{4}$$

$$③ \int_0^1 20x^7 \, dx = \frac{20x^8}{8} \Big|_0^1 = \boxed{\frac{20}{8}}$$

2. Evaluate the triple integral

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

where

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

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

$$① \int_{2x}^{3x} yz \ln(x^5) \, dz = \frac{yz^2 \ln(x^5)}{2} \Big|_{2x}^{3x} = \frac{9yx^2 \ln(x^5)}{2} - \frac{4yx^2 \ln(x^5)}{2}$$

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

$$\int_0^1 5x^4 \ln(x^5) \, dx \quad u = x^5 \to [0,1] \quad \int_0^1 \ln(u) \, du = -1/4$$

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