

"QUIZ" for Lecture 14

NAME: (print!) Krithika Patrachari Section: 22

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

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

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

$$\frac{1}{2} \int_x^{3x} x^2 y^3 \, dy \rightarrow \frac{1}{2} \cdot \frac{x^2 y^4}{4} \Big|_x^{3x} = \frac{81x^6}{8} - \frac{x^6}{8} = 10x^6$$

$$\int_0^1 10x^6 \, dx \rightarrow 10$$

2. Evaluate the triple integral

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

where

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

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

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

$$\begin{aligned} \frac{5x^2}{2} \ln(x^5) \int_0^x y \, dy &= \frac{5x^2}{2} \ln(x^5) \frac{y^2}{2} \Big|_0^x \\ &= \frac{5x^4}{2} \ln(x^5) \end{aligned}$$

$$\frac{5}{2} \int_0^1 x^4 \ln(x^5) \, dx = \frac{5}{2} \left(\frac{x^5}{5} \ln(x^5) - \frac{x^5}{5} \right) = -\frac{1}{2}$$