"QUIZ" for Lecture 14

NAME: (print!) _____ **Section:** _____

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

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

$\int_0^y x^2 yz \, dz$

$= \frac{1}{2} y^2 z x^2$

$\int_x^{3x} \frac{1}{2} y^2 z x^2 \, dy$

$= \frac{1}{6} y^3 z x^2 \Big|_x^{3x}$

$= \frac{1}{6}(3x)^3 z x^2 - \frac{1}{6} x^3 z x^2$

$= \frac{27}{6} z x^5 - \frac{1}{6} z x^5$

$= \frac{26}{6} z x^5 = \frac{13}{3} z x^5$

$\int_0^1 \frac{13}{3} z x^5 \, dx$

$= \frac{13}{6} z x^6 \Big|_0^1$

$= \frac{13}{6} z$

2. Evaluate the triple integral

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

where

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

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

$= \frac{1}{2} y z^2 \ln(x^5) \Big|_{2x}^{3x}$

$= \frac{1}{2}(3x)^2 y \ln(x^5) - \frac{1}{2}(2x)^2 y \ln(x^5)$

$= \frac{9}{2} y x^2 \ln(x^5) - 2 y x^2 \ln(x^5)$

$= \frac{5}{2} y x^2 \ln(x^5)$

$\int_0^x \frac{5}{2} y x^2 \ln(x^5) \, dy$

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

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

$\int_0^1 \frac{5}{4} x^4 \ln(x^5) \, dx$

$= \boxed{0}$