"QUIZ" for Lecture 14

NAME: (print!) Prathik Lolla **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

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

$$\int_0^y x^2yz\,dz = \left[\frac{x^2yz^2}{2}\right]_0^y = \frac{x^2y^3}{2}$$

$$\int_x^{3x} \frac{x^2y^3}{2}\,dy = \left[\frac{x^2y^4}{8}\right]_x^{3x} = \frac{81x^6}{8} - \frac{x^6}{8}$$

$$\int_0^1 10x^1\,dz = \left[\frac{10x^7}{7}\right]_0^1 = \frac{10}{7}$$

$$\boxed{\int_0^1 \int_x^{3x} \int_0^y x^2yz\,dz\,dy\,dx = \frac{10}{7}}$$

2. Evaluate the triple integral

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

where

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

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

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

$$\int_0^1 \int_0^x \frac{1}{2}\left(9x^2y\ln(x^5) - 4x^2y\ln(x^5)\right)dy\,dx = -\frac{1}{4}$$

$$\boxed{\int_0^1 \int_0^x \int_{2x}^{3x} yz\ln(x^5)\,dz\,dy\,dx = -\frac{1}{4}}$$