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Vash Zhangura "Quiz" for Lecture 14 Sections: 24

1. Evaluate the iterated integral

$$\int_0^1 \int_x^{3x} \int_0^y x^2 y z \, dz dy dx = \int_0^1 \int_x^{3x} x^2 y \frac{z^2}{2} \Big|_0^y dy dx = \int_0^1 \int_x^{3x} \frac{1}{2} x^2 y^2 dy dx$$

$$= \int_0^1 \frac{1}{8} x^2 y^3 \Big|_x^{3x} dx = \int_0^1 \frac{81}{8} x^6 - \frac{1}{8} x^6 dx = \int_0^1 10x^6 dx = \frac{10}{7} x^7 \Big|_0^1 = \frac{10}{7}$$

2. Evaluate the triple integral where  $\Sigma = \{(x, y, z) \mid 0 \leq x \leq 1, 0 \leq y \leq x, 2x \leq z \leq 3x\}$

$$\iiint_{\Sigma} yz \ln(x^5) \, dV = \int_0^1 \int_0^x \int_{2x}^{3x} yz \ln(x^5) \, dz dy dx = \int_0^1 \int_0^x \frac{5}{2} y x^2 \ln(x^5) dy dx = \int_0^1 \frac{5}{4} x^4 \ln(x^5) dx$$

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