

$$\begin{aligned}
1. & \int_0^1 \int_x^{3x} \int_0^y \frac{2}{x} x^2 y z \, dz dy dx \\
&= \int_0^1 \int_x^{3x} \frac{x^2 y z^2}{2} \Big|_0^y dy dx \\
&= \int_0^1 \int_x^{3x} \frac{x^2 y^3}{2} dy dx \\
&= \int_0^1 \frac{x^2 y^4}{8} \Big|_x^{3x} dx \\
&= \int_0^1 10x^6 dx \\
&= \frac{10x^7}{7} \Big|_0^1 \\
&= \frac{10}{7}
\end{aligned}$$

$$\begin{aligned}
2. & \iiint_E yz \ln(x^5) \, dV \quad E = \{(x, y, z) \mid 0 \leq x \leq 1, 0 \leq y \leq x, 2x \leq z \leq 3x\} \\
& \int_0^1 \int_0^x \int_{2x}^{3x} yz \ln(x^5) \, dz dy dx \\
&= \int_0^1 \int_0^x \frac{5y \ln(x^5) z^2}{2} \Big|_{2x}^{3x} dy dx \\
&= \int_0^1 \int_0^x \frac{25x^2 \ln(x) y}{2} dy dx \\
&= \int_0^1 \frac{25x^2 \ln(x) y^2}{4} \Big|_0^x dx \\
&= \int_0^1 \frac{25x^4 \ln(x)}{4} dx \\
&= \frac{x^5 (5 \ln(x) - 1)}{4} \Big|_0^1 \\
&= -\frac{1}{4}
\end{aligned}$$

