Name:
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Math 2D: Quiz 7

(4) **1.** Evaluate $\iiint_E 6xz\ dV$, where $E = \{(x, y, z) : 0 \le z \le 1, 0 \le x \le z, 0 \le y \le x + z\}$

$$\begin{aligned}\iiint_E 6xz\ dV &= \int_0^1 \int_0^z \int_0^{x+z} 6xz\ dydxdz = \int_0^1 \int_0^z 6xyz\Big|_0^{x+z}\ dxdz \\ &= \int_0^1 \int_0^z 6x^2z + 6xz^2\ dxdz = \int_0^1 2x^3z + 3x^2z^2\Big|_0^z \\ &= \int_0^1 5z^4\ dz = z^5\Big|_0^1 = 1\end{aligned}$$

(6) **2.** Set up the following solids as triple integrals, DO NOT integrate.

a. The volume of the tetrahedron enclosed by the coordinate planes and the plane $2x+y+z = 4$

Looking at the projection of the solid on the $xy-$plane, we have $y = 4 - 2x$, and when $y = 0$ we have $0 \le x \le 2$. Hence our integral is:

$$\int_0^2 \int_0^{4-2x} \int_0^{4-2x-y} dzdydx$$

b. The solid bounded by the cylinder $y = x^2$ and the planes $z = 0$, $z = 4$, $y = 9$.

If $y = x^2$ is cut off by the plane $y = 9$ then $-3 \le x \le 3$, and $0 \le z \le 4$, since z is bounded by the two planes. Hence our integral is:

$$\int_{-3}^3 \int_{x^2}^9 \int_0^4 dzdydx$$