

Please PRINT your name _____

No calculators, cell phones, computers, notes, etc.

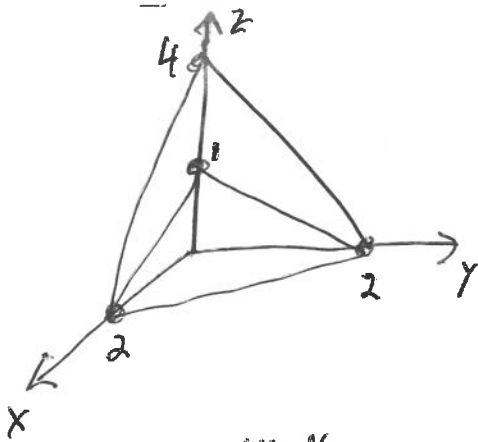
Circle your answer. Make your work correct, complete and coherent.

Please take a picture of your quiz (for your records) just before you turn the quiz in. I will e-mail your grade and my comments to you. I will keep your quiz.

The quiz is worth 5 points. The solutions will be posted on my website later today.

Quiz 7, April 17, 2023

Find the volume of the region between the planes $x + y + 2z = 2$ and $2x + 2y + z = 4$ in the first octant. (You must draw a meaningful picture.)



$$\text{Vol} = \int_0^2 \int_0^{2-x} \int_{\text{lower plane}}^{\text{upper plane}} dz dy dx = \int_0^2 \int_0^{2-x} \int_{1-\frac{y}{2}-\frac{x}{2}}^{4-2x-2y} dz dy dx$$

$\int_0^2 \int_0^{2-x} \int_{1-\frac{y}{2}-\frac{x}{2}}^{4-2x-2y} dz dy dx$
upper plane
lower plane
 $y = 2-x$

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Quiz 7, April 17, 2023

Find the volume of the region between the planes $x + y + 2z = 2$ and $2x + 2y + z = 4$ in the first octant. (You must draw a meaningful picture.)

The volume is equal to

$$\begin{aligned} & \int_0^2 \int_0^{2-x} \int_{\frac{2-x-y}{2}}^{4-2x-2y} dz dy dx \\ &= \int_0^2 \int_0^{2-x} (4 - 2x - 2y - (1 - \frac{x}{2} - \frac{y}{2})) dy dx \\ &= \int_0^2 \int_0^{2-x} (3 - \frac{3}{2}x - \frac{3}{2}y) dy dx \\ &= \int_0^2 (3y - \frac{3}{2}xy - \frac{3}{4}y^2) \Big|_0^{2-x} dx \\ &= \int_0^2 (3(2-x) - \frac{3}{2}x(2-x) - \frac{3}{4}(2-x)^2) dx \\ &= (-\frac{3}{2}(2-x)^2 - \frac{3}{2}x^2 + \frac{(2-x)^3}{3}) \Big|_0^2 \\ &= -6 + 4 - (-6 + 2) = \boxed{2} \end{aligned}$$