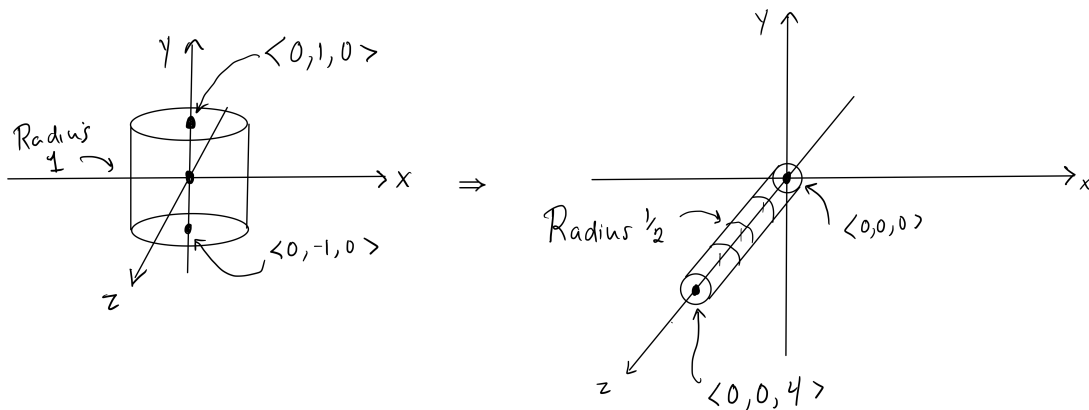


Name: Answer Key

PID:

1. A cylinder C has height 2 and radius 1. The cylinder is vertically centered around the y -axis at the origin so that the central axis of the cylinder goes from $\langle 0, -1, 0 \rangle$ to $\langle 0, 1, 0 \rangle$. A transformation A maps the cylinder C to the cylinder of radius $1/2$ and height 4 (or, length 4) that is centered around the z -axis that has central axis extending from $\langle 0, 0, 0 \rangle$ to $\langle 0, 0, 4 \rangle$.

Express A as a composition of translations $T_{\mathbf{u}}$, rotations $R_{\theta, \mathbf{u}}$ and scalings $S_{\langle \alpha, \beta, \gamma \rangle}$. (There are many possible correct answers.)



Possible answers:

$$R_{\pi/2, \vec{x}} \circ T_{\langle 0, 2, 0 \rangle} \circ S_{\langle 1/2, 2, 1/2 \rangle}$$

$$R_{\pi/2, \vec{x}} \circ S_{\langle 1/2, 2, 1/2 \rangle} \circ T_{\langle 0, 1, 0 \rangle}$$

$$T_{\langle 0, 0, 2 \rangle} \circ R_{\pi/2, \vec{x}} \circ S_{\langle 1/2, 2, 1/2 \rangle}$$

$$T_{\langle 0, 0, 2 \rangle} \circ S_{\langle 1/2, 1/2, 2 \rangle} \circ R_{\pi/2, \vec{x}}$$

$$S_{\langle 1/2, 1/2, 2 \rangle} \circ T_{\langle 0, 0, 1 \rangle} \circ R_{\pi/2, \vec{x}}$$

$$S_{\langle 1/2, 1/2, 2 \rangle} \circ R_{\pi/2, \vec{x}} \circ T_{\langle 0, 1, 0 \rangle}$$