1. Let \( D \) be the region in the plane bounded by \( y = x^2 \) and \( y = 1 \). Write the double integral \( \int\int_D f(x, y) \, dA \) as an iterated integral in both possible orders.

2. Let \( D \) be the trapezoid in the plane with vertices \((0, 0), (2, 0), (1, 1), \) and \((0, 1)\). Write the double integral \( \int\int_D f(x, y) \, dA \) as an iterated integral in both possible orders. Which one is easier?

3. Evaluate the double integral \( \int\int_D \sqrt{y^3 + 1} \, dA \) where \( D \) is the region in the first quadrant bounded by \( x = 0, y = 1, \) and \( y = \sqrt{x} \). Try the integration in both possible orders. Which one is easier?
4. Evaluate the iterated integral
\[ \int_0^1 \int_{-\sqrt{1-x^2}}^0 2x \cos \left( y - \frac{y^3}{3} \right) \, dy \, dx. \]

5. Determine the projection onto the $xy$-plane of the region $W \subseteq \mathbb{R}^3$ bounded by the planes $x = 0, y = 0, z = 0,$ and $x + y + z = 1.$

6. Determine the projection onto the $xy$-plane of the region $W \subseteq \mathbb{R}^3$ bounded by the surfaces $z = \sqrt{x^2 + y^2}$ and $x^2 + y^2 + z^2 = 1.$
7. In this problem you will integrate the function \( f(x, y, z) = y \) over the region \( \mathcal{W} \subseteq \mathbb{R}^3 \) bounded by the surfaces \( z = 8 - x^2 - y^2 \) and \( z = x^2 + y^2 \).

(a) Sketch the region \( \mathcal{W} \).

(b) Determine the projection of \( \mathcal{W} \) onto the \( xy \)-plane.

(c) Notice that \( \mathcal{W} \) is \( z \)-simple. This means we can write
\[
\iiint_{\mathcal{W}} y\,dV = \iint_{\mathcal{D}} \int_{z_1}^{z_2} y\,dz\,dA
\]
where \( \mathcal{D} \) is the projection found in part (b). Use this to write the triple integral as an iterated triple integral of the form \( dz\,dy\,dx \).

(d) Finally, compute the triple integral.

(e) What goes wrong if you try to compute the iterated integral instead as \( dz\,dx\,dy \)?