2) Calculate \( \iiint_{\mathcal{D}} x \, dA \) where \( \mathcal{D} \) is the triangular region with vertices \((0,0), (1,1), (1,-1)\).
3) Calculate \( \int_0^1 \int_y \frac{\sqrt{x^2-y^2}}{x^2+y^2} \, dx \, dy \) by changing to polar coordinates.

4) a) Sketch the region of integration for \( \int_{-1}^1 \int_{x^2}^1 (1+y^{3/2})^5 \, dy \, dx \).

b) Switch the order of integration for the integral in a).

c) Calculate the integral in b).
Set up iterated triple integrals, with appropriate limits, for finding
the volume of the solid bounded by \( z = x^2 + y^4 \) and \( z = 8 - x^2 - y^2 \) in:
(a) rectangular coordinates

(b) cylindrical coordinates.

(6) Set up an iterated triple integral, with the appropriate limits in the coordinates of your choice, for finding the volume of
the region that lies between the spheres \( x^2 + y^2 + z^2 = 1 \) and
\( x^2 + y^2 + z^2 = 9 \), and "inside" the cone \( z = \sqrt{x^2 + y^2} \) (that is, \( z \leq \sqrt{x^2 + y^2} \)).

DO NOT EVALUATE.
7) Calculate the line integrals.

a) \[ \int_C (x+y) \, ds \], where \( C \) is the straight line segment from \((1,2)\) to \((4,6)\).

b) \[ \int_C x \, dy - y \, dx \], where \( C \) is the semi-circle \( x^2 + y^2 = 9 \), \( y \geq 0 \), oriented counterclockwise.

c) \[ \int_C \mathbf{F} \cdot d\mathbf{r} \], where \( \mathbf{F}(x,y) = \langle 2x+y, x-2y \rangle \) and \( C \) is as pictured.