15.4 Problem Set

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1. Determine
\[ \int \int_{R} xy \, dA \]
when \( R \) is the part of the disk bounded by \( x^2 + y^2 = 1 \) which lies in the first quadrant, using polar coordinates.

2. Sketch the region of integration for the integral
\[ \int_{0}^{\pi/2} \int_{0}^{1} r \sin(\theta) \, rdr \, d\theta \]
and evaluate the integral.

3. Set up and evaluate using polar coordinates an integral representing the volume of the surface bounded by \( z = 4 - x^2 - y^2 \) and the \( xy \) plane.