1. Sketch the region of integration, then reverse the order of integration, and evaluate the integral.

\[
\int_0^{\sqrt{3}} \int_{\cot^{-1}(y)}^{\cos^{-1}(y/2)} y \, dx \, dy
\]

2. Sketch the region \( R \) bounded by the curves, \( y = x^2 \), and \( y = 2x - x^2 \). Then evaluate the double integral,

\[
\int_R xy \, dA
\]

3. Find the average value of \( f(x, y) = x^2 y \) bounded by the parabola \( y = x^2 \) and the line \( y = x + 2 \).