1. **(5 points)** Calculate the integral $\iint_R \cos(x+2y)dA$ over the region $R = \{(x,y)|0 \leq x \leq \pi, 0 \leq y \leq \frac{\pi}{2}\}$.

2. **(6 points)** Find the integral of xy over the region bounded by the curves $y = x$ and $y = x^4$.

3. **(4 points)** Set up (but do not evaluate) an integral to determine the volume of the solid enclosed by the planes $y = 2x$, $z = 0$, $x = 0$, and $z = 4 - y$.

4. **(5 points)** Set up (but do not evaluate) a polar-coordinate iterated form of $\iint_R x^2 - y^2 dA$, where A is the region where $x \geq 0$, $y \geq 0$, and $1 \leq x^2 + y^2 \leq 16$.