1. Evaluate the definite integral $\int_R 2xy \, dA$ where $R$ is the region bounded by the lines $y = 0$, $y = 2x$, and $x = 1$.

2. Evaluate the integral by first reversing the order of integration: $\int_0^2 \int_{2y}^1 e^{x^2} \, dx \, dy$. 
3. **Find an integral expression for the moment** $M_x$ of the lamina with density 1 occupying the region between the parabolas $y = x^2$ and $y = 8 - x^2$. **Do not evaluate the integral.**

4. **Find an integral expression for the volume of the solid** under the surface $z = x^2y$ and above the triangular region in the $xy$-plane with vertices $(0,0)$, $(1,0)$, and $(0,1)$. **Do not evaluate the integral.**
5. Find the volume of the solid below the paraboloid $z = 9 - x^2 - y^2$, above the $xy$-plane, and outside the cylinder $x^2 + y^2 = 1$.

6. Find an integral expression in spherical coordinates for the moment $M_{zz}$ of the solid inside the sphere $x^2 + y^2 + z^2 = 9$, outside the sphere $x^2 + y^2 + z^2 = 1$ and above $z = 0$. Do not evaluate the integral.
7. Let $R$ be the part of a (solid) sphere of radius 1 in the first octant. Express the integral $\iiint_{R} z \, dV$ in Cartesian, Cylindrical, and Spherical coordinates.

8. The transformation $x = 2u, y = 3v$ transforms the half disk $D = \{(u, v) \mid u^2 + v^2 \leq 1, v \geq 0\}$ into the half ellipse $E = \{(x, y) \mid 9x^2 + 4y^2 = 36, y \geq 0\}$. Use this transformation to evaluate the integral $\iint_{E} y \, dA$. Hint: use another change of variables to polar coordinates.