Question 1 (12 pts.). Find the volume of the solid under the surface $z = y + 1$ and above the region bounded by $y = \ln x$, $y = 0$, $x = 0$ and $y = 1$.

Answer: ......................
Question 2 (12 pts.). Evaluate \( \iint_D 2xy \, dA \), where \( D \) is bounded by \( y = x^3 \) and \( y = x \) in the first quadrant.

Answer: 

Question 3 (12 pts.). Evaluate \( \int_0^2 \int_{y/2}^1 e^{x^2} \, dx \, dy \). (Hint: reverse the order of integration).

Answer: 

Question 4 (12 pts.). Find the volume of the solid enclosed by the cone \( z = -\sqrt{x^2 + y^2} \) and the plane \( z = -1 \).

Answer: .......................  

Question 5 (12 pts.). Find the area of the region bounded by the ellipse \( \frac{x^2}{9} + \frac{y^2}{4} = 1 \). (Hint: use the transformation \( x = 3u, y = 2v \).)

Answer: .......................
Question 6 (12 pts.). Evaluate \( \iiint_E y^2 dV \), where \( E \) is the tetrahedron bounded by \( x = 0, y = 0, z = 0, \) and \( x + y + z = 1 \).

Answer: ...................
Question 7 (12 pts.). Let $E$ be the solid sphere $x^2 + y^2 + z^2 \leq 1$ with a constant density. Find its moment of inertia $I_z$ about the $z$-axis.

Answer: ....................
Question 8 (16 pts.). A lamina occupies the region $D = \{(x, y) \mid x^2 + y^2 \leq 1, \ y \geq 0\}$ and has the density $\rho(x, y) = y$. Find its center of mass.

Answer: ..................