MA227-6D, CALCULUS III
December 03, 2012

Name (Print last name first): .....

Student Signature: .....

TEST III

Show all of your work for full credit.

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 $\iint_D 2xydA$, where D is bounded by $y = x^3$ and $y = x$ in the first quadrant.

Answer: .....

Question 3 (12 pts.). Evaluate $\int_0^2 \int_{y/2}^1 e^{x^2} dxdy$. (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 $\dfrac{x^2}{9} + \dfrac{y^2}{4} = 1$. (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: .....