MATH 261 Sample Exam 3

Simplify all answers. **Show your work!** | Name:

Score	
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1. a) Find $\int\int_R ye^{xy}\,dydx$; $R = [0,2] \times [0,2]$.

   Ans:_____.

   b) Find $\int_0^2 \int_0^1 x/(y^2+1)\,dydx$

   Ans:_____.

2. Find the volume in the first octant bounded by $z = 9 - y^2$ and $y = x$.

   a) Set up the integral.

   Ans:_____.

   b) Evaluate the integral.

   Ans:_____.

3. Let $I = \displaystyle\int_0^1 \int_{x^2}^1 x^3 e^{y^3}\,dydx$.

   a) Reverse the order of integration.

   Ans:_____.

   b) Compute the integral.

   Ans:_____.

4. Let $I = \displaystyle\int\int_D xy\,dydx$, where D is the region bounded by $x = \sqrt{4-y^2}$ and $x = 0$.

   a) Convert to polar coordinates.

   Ans:_____.

   b) Evaluate the integral.

   Ans:_____.

5. Convert the equation of the surface $z = \sqrt{3}r$ to:

   a) Cartesian Coordinates.

   Ans:_____.

   b) Spherical coordinates.

   Ans:_____.

Extra Space

Part II.	Name:

6. Let V be the volume bounded by the paraboloids $y = 3x^2 + 3z^2$ and $y = 4 - x^2 - z^2$.

a) Set up the volume integral.

Ans:_____.

b) Compute the integral.

Ans:_____.

7. A lamina with $\sigma = x^2 + 3y$ is bounded by $y = x - 2$ and $x = y^2$. Set up the integrals for:

a) The c.m. coordinate $\overline{x}$.

Ans:_____.

b) The moment of inertia I_x.

Ans:_____.

8. A tetrahedron has vertices at $P(1, 0, 0), Q(0, 1, 0), R(0, 0, 1)$ and $(0, 0, 0)$.

a) Write the equation of the plane PQR.

Ans:_____.

b) Set up an integral for the volume.

Ans:_____.

9. Use spherical coordinates to evaluate $\int\int\int_E z\, dV$ where E is the region bounded by $z = \sqrt{1 - x^2 - y^2}$, $z = \sqrt{9 - x^2 - y^2}$, and $z = 0$.

a) Set up the integral.

Ans:_____.

b) Compute the integral.

Ans:_____.

10. Compute the Jacobian of the following transformations:

a) $x = uv$, $y = 4u + 3v$.

Ans:_____.

b) $x = uv$, $y = 4u + 3v$, $z = 5w$.

Ans:_____.

Extra space