

**KING SAUD UNIVERSITY**      **COLLEGE OF SCIENCE**  
**M203**    **DEPARTMENT OF MATHEMATICS**    **TIME: 90 Minutes**  
(SEMESTER 2, 1439-1440)  
Second Mid-term Exam

*Note: All questions carry equal Marks.*

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Q1. Evaluate the iterated integral  $\int_0^4 \int_{\sqrt{y}}^2 \frac{1}{\sqrt{x^3+1}} dx dy$ .

Q2. Evaluate the integral  $\iint_R \frac{x^2}{x^2+y^2} dA$ , where the region  $R$  is bounded by the graphs of the equations:  $x^2 + y^2 = 1$  and  $x^2 + y^2 = 4$ .

Q3. Find the surface area of the portion of the cone  $z^2 = 4x^2 + 4y^2$  that is above the region in the first quadrant bounded by the line  $y = x$  and the parabola  $y = x^2$ .

Q4. Use cylindrical coordinates to evaluate the integral:

$$\int_{-3}^3 \int_{-\sqrt{9-x^2}}^{\sqrt{9-x^2}} \int_0^{9-x^2-y^2} x^2 dz dy dx$$

Q5. A solid  $Q$  is bounded by the sphere  $z = \sqrt{4 - x^2 - y^2}$  and the  $xy$ -plane and the mass density of  $Q$  is given by the function:  $\delta(x, y, z) = 2 + x^2 + y^2 + z^2$ . Use spherical coordinates to find the moment of inertia of  $Q$  with respect to the  $z$ -axis.