

**KING SAUD UNIVERSITY      COLLEGE OF SCIENCE**  
**M203   DEPARTMENT OF MATHEMATICS   TIME: 90 Minutes**  
**(SEMESTER 1, 1441)**

*Second Mid-term Exam*

*Note: All questions carry equal Marks.*

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Q1. Evaluate the iterated integral

$$\int_1^e \int_{\ln(y)}^1 \frac{e^{x^2}}{y} dx dy.$$

Q2. Use polar coordinates to evaluate the integral

$$\int_0^4 \int_{-\sqrt{4x-x^2}}^0 \sqrt{x^2 + y^2} dy dx.$$

Q3. Find the surface area of the part of the solid cut off from the paraboloid  $z = x^2 + y^2$  by the plane  $z = 4$ .

Q4. Find the centroid of the solid bounded by the graphs of the equations:  $x^2 + y^2 = 1$ ,  $z = \sqrt{x^2 + y^2}$ ,  $z = 0$ .

Q5. Evaluate the integral:

$$\int_0^2 \int_0^{\sqrt{4-x^2}} \int_0^{\sqrt{16-x^2-y^2}} (x^2 + y^2 + z^2) dz dy dx$$