

MID TERM II EXAMINATION
SEMESTER I, 1433-1434
Department of Mathematics
King Saud University
MATH: 203 Time: 90 Minutes Full Marks: 25

Question # 1. [Marks: 4]

Evaluate the integral $\int_0^2 \int_y^2 e^{x^2} dx dy$.

Question # 2. [Marks: 4]

Evaluate the integral using polar coordinates.

$$\iint_R \sqrt{4 - x^2 - y^2} dA,$$

where R is the region bounded by the circle $x^2 + (y - 1)^2 = 1$.

Question # 3. [Marks: 4]

Find the surface area of the portion of the surface $z = xy$ that is above the region in the first quadrant bounded by the lines $y = x, y = 0$, and the circle $x^2 + y^2 = 9$.

Question # 4. [Marks: 4]

The area mass density of the lamina in the shape of the region bounded by the graphs of $y^2 = x$ and $x + y = 2$ is given by $\delta(x, y) = x$. Find the mass of the lamina.

Question # 5. [Marks: 4]

Find the center of the mass of the homogeneous solid that lies inside the cone $z = \sqrt{x^2 + y^2}$ and the hemisphere $z = \sqrt{1 - x^2 - y^2}$.

Question # 6. [Marks: 5]

Use cylindrical coordinates to evaluate the integral

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