

Assignment 5

Marks **Total marks for Assignment 5: 56**

- [7] 1. Sketch the solid whose volume is given by $\int_0^3 \int_0^{3-y} \int_0^{3-x-y} dz dx dy$ and evaluate the triple integral.
- [8] 2. Find the moment of inertia about the x – axis for a rectangular brick with dimensions a, b, c and mass M if the centre of the brick is located at the origin and its edges are parallel to the coordinate axes.
- [10] 3. Find the exact centre of mass of the lamina that occupies the region bounded by $y = 6 - x^2$ and $y = x$, if its mass density is given by $\rho(x, y) = x^2$.
- [5] 4. Find the exact volume of the solid region bounded by the surfaces $z = \sqrt{y}$, $x + y = 1$, $z = 0$ and $x = 0$.
5. Use cylindrical or spherical coordinates to evaluate exactly the following:
- [8] a) $\int_0^a \int_0^{\sqrt{a^2-y^2}} \int_0^{a^2-x^2-y^2} x^2 dz dx dy$
- [8] b) $\int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_{\sqrt{x^2+y^2}}^{\sqrt{8-x^2-y^2}} z^2 dz dy dx$

6. The figure below shows the region of integration for

$$\int_0^1 \int_0^{1-y} \int_0^{1-x^2} f(x, y, z) dz dx dy .$$

Rewrite this integral as an equivalent iterated integral expression using

[3] a) the order $dy dx dz$

[7] b) the order $dx dz dy$

