In your tutorial, your tutor will work through the unstarred problems, and you will be expected to work on the starred problems yourself. The participation mark will be awarded only if you make a serious attempt at the starred problems.

1. Find the surface area of the part of the sphere \( x^2 + y^2 + z^2 = 25 \) that lies between the planes \( z = 3 \) and \( z = 4 \).

*2. Find the surface area of the part of the paraboloid \( z = 10 - x^2 - y^2 \) which lies above the \( xy \)-plane.

3. Let \( S \) be the triangular portion of the plane \( 3x + 3y + 5z = 30 \) in the first octant – that is, the portion of the plane cut off by the planes \( x = 0 \), \( y = 0 \) and \( z = 0 \), for \( x \geq 0 \), \( y \geq 0 \) and \( z \geq 0 \).
   (i) Sketch the region \( S \).
   (ii) Let \( R \) be the projection of \( S \) onto the \( xy \)-plane.
   Describe \( R \), in terms of \( x \) and \( y \).
   (iii) Suppose that a thin plate in the shape of \( S \) has density \( (x + y + z) \) at each point \((x, y, z)\). Find the mass of the plate. (Mass = \( \iint_S (x + y + z) \, dS \)).

*4. Let \( S \) be the surface defined by the following set of points in \( \mathbb{R}^3 \):
   \[ \{(x, y, z) \mid x + z = 5, \ 0 \leq x \leq 3, \ 0 \leq y \leq 4 \} \]
   (i) Sketch \( S \), and its projection onto the \( xy \)-plane.
   (ii) Find the cost of painting this surface if the cost is \( $(xy + z^2)$ \) per unit area. (Cost = \( \iint_S (xy + z^2) \, dS \)).