

## PARAMETRIC SURFACES AND AREAS

**Problem 1.** (i) Find a parametric representation for the sphere  $x^2 + y^2 + z^2 = 1$ .  
(ii) Find a parametric representation of the lower half of the ellipsoid  $2x^2 + 4y^2 + z^2 = 1$ .

**Problem 2.** Find parametric equations for the surface generated by rotating the curve  $y = \sin x$ ,  $0 \leq x \leq 2\pi$  around the  $x$ -axis. Sketch the graph of the surface of revolution.

**Problem 3.** Find the tangent plane to the surface with parametric equations  $x = u^2$ ,  $y = v^2$  and  $z = 3u + 2v$  at the point  $(1, 1, 5)$ .

**Problem 4.** Compute the surface area of the sphere from Problem 1.

**Problem 5.** Find the area of the part of the paraboloid  $z = x^2 + y^2$  that lies under the plane  $z = 25$ .

**Problem 6.** Find the area of the rotational surface obtained by rotating a curve  $y = f(x)$ ,  $a \leq x \leq b$  around the  $x$ -axis provided  $f(x) \geq 0$  and  $f'$  is continuous.