

**Math 13 Homework #7**  
Due Wednesday, May 15th

- (1) For each of the following parameterizations given by  $G$ , calculate  $\mathbf{T}_u$ ,  $\mathbf{T}_v$ , and  $\mathbf{N}(u, v)$  for the parameterized surface at the given point.

(a)  $G(u, v) = (u^2 - v^2, u + v, u - v); \quad u = 2, v = 3.$

(b)  $G(r, \theta) = (r \cos(\theta), r \sin(\theta), 1 - r^2); \quad r = 1/2, \theta = \pi/4.$

- (2) For each of the following functions  $f$  and surfaces  $S$ , calculate

$$\iint_S f(x, y, z) \, dS.$$

(a)  $G(u, v) = (u, v^3, u + v), \quad 0 \leq u \leq 1, 0 \leq v \leq 1; \quad f(x, y, z) = y.$

(b)  $z = 4 - x^2 - y^2, \quad 0 \leq z \leq 3; \quad f(x, y, z) = x^2/(4 - z).$

- (3) Find the surface area of the following surfaces:

(a) The part of the cone  $x^2 + y^2 = z^2$  between the planes  $z = 2$  and  $z = 5$ .

(b) The portion of the plane  $2x + 3y + 4z = 28$  lying above the rectangle  $1 \leq x \leq 3$ ,  $2 \leq y \leq 5$  in the  $xy$ -plane.

- (4) Show that the surface area of the portion of the sphere of radius  $R$  between two horizontal planes  $z = a$  and  $z = b$  is equal to the surface area of the corresponding portion of the circumscribed cylinder of radius  $R$  between  $z = a$  and  $z = b$ .