FRIDAY 17TH OCTOBER : PARAMETRIZING SURFACES / FUNCTIONS OF SEVERAL VARIABLES

Reading: sections 10.5 and 11.1
Homework: see `www.courses.fas.harvard.edu/~math21a/`

1. Parametrizing surfaces

(1) Give a parametrization of the part of the plane

$$3x + 2y + z = 4$$

which lies inside the cylinder

$$x^2 + y^2 = 4$$

(2) Give a parametrization of the part of the ellipsoid

$$\frac{x^2}{4} + y^2 + \frac{z^2}{9}$$

which lies in front of the plane $x = 0$.

2. Surfaces of revolution

(1) Show that rotating the curve $x = \sqrt{z}$ (in the xz-plane) about the z-axis gives the paraboloid $z = x^2 + y^2$. Use this to give a parametrization of the paraboloid.

3. Functions of several variables

(1) Sketch level curves and draw the graph $z = f(x, y)$ for:
   (a) $f(x, y) = e^{x-y}$
   (b) $f(x, y) = xy$

(2) Describe (in words) level surfaces for
   (a) $f(x, y, z) = x + 2y + 3z$
   (b)
$$f(x, y, z) = \frac{1}{\sqrt{x^2 + y^2 + z^2}}$$