

### 13 For lecture on 11/14

1. Convert from Cartesian coordinate to polar coordinate before integration.
  - (a) Find  $\iint_D xy \, dx \, dy$  where  $D$  is the region bounded by the  $x$ -axis, the line  $y = x$  and the circle  $x^2 + y^2 = 1$ .
  - (b) Find the volume of the solid bounded by the paraboloid  $z = 4 - x^2 - y^2$  and the  $xy$ -plane.
  - (c) Find the volume inside the sphere and outside the cylinder  $x^2 + y^2 = 9$ .
2. Evaluate  $\iint_D xy \, dA$ , where  $D$  is the triangle region with vertices  $(0, 1)$ ,  $(1, 2)$ ,  $(4, 1)$ .
3. Evaluate  $\iint_R \arctan \frac{y}{x} \, dA$ , where  $R = \{(x, y) | 1 \leq x^2 + y^2 \leq 4, 0 \leq y \leq x\}$ .
4. Evaluate  $\iint_D xy \, dA$ , where  $D$  is the interior of the ellipse  $\frac{x^2}{9} + \frac{y^2}{16} = 1$ , by using the change of variables  $x = 3r \cos \theta$ ,  $y = 4r \sin \theta$ .