

**Math 2013 Assignment 5**  
**Due Friday Feb. 19 in class**

1. Find a parametric representation of the surface
  - (a) The plane that passes through the point  $(2, 1, 3)$  and is parallel to the vectors  $\langle 1, -1, 1 \rangle$  and  $\langle 0, 2, -3 \rangle$ .
  - (b) The part of the sphere  $x^2 + y^2 + z^2 = 36$  that lies between the planes  $z = -3$  and  $z = 3$
2. Find an equation for the tangent plane of the surface parametrized by  $\vec{r}(u, v) = (1 - u^2 - v^2)\vec{i} - u\vec{j} - v\vec{k}$  at the point  $(-1, -1, -1)$ .
3. Find the area of the part of the part of the cone  $z = \sqrt{x^2 + y^2}$  that lies between the plane  $y = x$  and the parabolic cylinder  $y = x^2$ .
4. Let  $b < a$  and rotate the circle in the  $xy$ -plane with centre  $(a, 0)$  and radius  $b$ , around the  $z$ -axis to obtain a torus.
  - (a) Find a parametrization of this torus.
  - (b) Find its surface area.
5. Compute  $\iint_S z \, dS$  where  $S$  is the surface  $x = y + 2z^2$ ,  $0 \leq y \leq 1$ ,  $0 \leq z \leq 1$ .