Calculus III
Spring 2011

Lines and Planes

Example 1. Find a vector equation for the line through $(-1, 2, 3)$ and $(2, -2, 5)$.

Example 2. Find a vector equation for the line through $(5, -6, 7)$ that is parallel to the line with parametric equations $x = 1 + t$, $y = 2$, $z = 3 + 2t$.

Example 3. Find the point of intersection of the lines from Examples 1 and 2.

Example 4. Show that the lines

$$L_1 : \quad \langle 1 + t, -3 - t, 5 + 2t \rangle$$
$$L_2 : \quad \langle 4 - s, -3 + s, 6 + 2s \rangle$$

are *skew* (i.e. neither parallel nor intersecting).

Example 5. Find an equation for the plane containing the points $(1, 2, 3)$, $(-2, 4, 1)$ and $(0, 6, -2)$.

Example 6. Show that the planes $2x - 5y + 9z = 6$ and $4x - 10y + 11z = 0$ are not parallel. Find parametric equations for their line of intersection.

Example 7. Find a formula for the (perpendicular) distance from the point (x_1, y_1, z_1) to the plane with equation $ax + by + cz + d = 0$.

Example 8. Find the distance between the lines of Example 4.