**3D Space**

**Defn** Let \((x_1, y_1, z_1)\) & \((x_2, y_2, z_2)\) be two points in 3D.
- The midpoint of the line segment joining these points is 
  \[
  \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2} \right)
  \]

- The distance between these points is 
  \[
  D = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2 + (z_2-z_1)^2}
  \]

**Defn** The set of all points \((x, y, z)\) in 3D space which are a distance \(r\) from a fixed point \((h, k, l)\) is a sphere (with center \((h, k, l)\) & radius \(r\)) given by equation 
  \[
  (x-h)^2 + (y-k)^2 + (z-l)^2 = r^2
  \]