MTHSC 206 Section 12.1 –Three dimensional coordinate systems

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- The positive direction along the z-axis will be determined by the so called *right-hand rule*.
- To each point P in space we associate a 3-tuple (a, b, c).
- To arrive at the point P, we travel a units along the x-axis, b units in the direction parallel to the y-axis and c units in the direction parallel to the z-axis.

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Exercise

What solution spaces are determined by the following?

- $z = 1$.
- $x = y$.
- $x = y = z$.
- $x = 2,\ y = 1,\ z = 3$.

Definition (Distance Formula)

The distance $|P_1P_2|$ between two points $P_1(x_1, y_1, z_1)$ and $P_2(x_2, y_2, z_2)$ is given by

$$|P_1P_2| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}.$$

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Find the distance between $(2, 1, 3)$ and $(1, -1, 5)$.

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What region of $\mathbb{R}^3$ is determined by the following inequalities.

$$1 \leq x^2 + y^2 + z^2 \leq 4, \quad z \leq 0$$

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