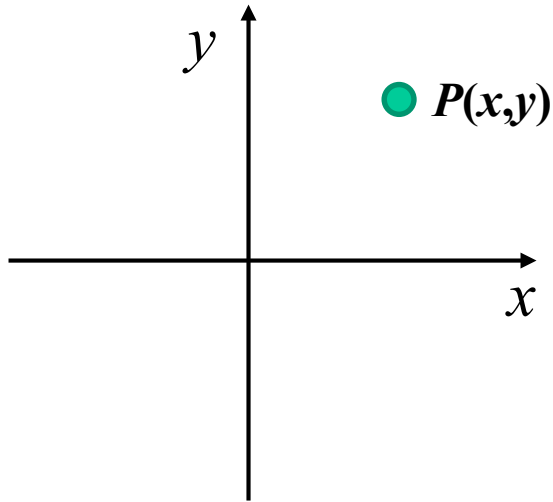


Moving from 2D to 3D

Cartesian plane



- two axes (x and y)
- one coordinate plane divided into four quadrants

I: $x > 0, y > 0$

II: $x < 0, y > 0$

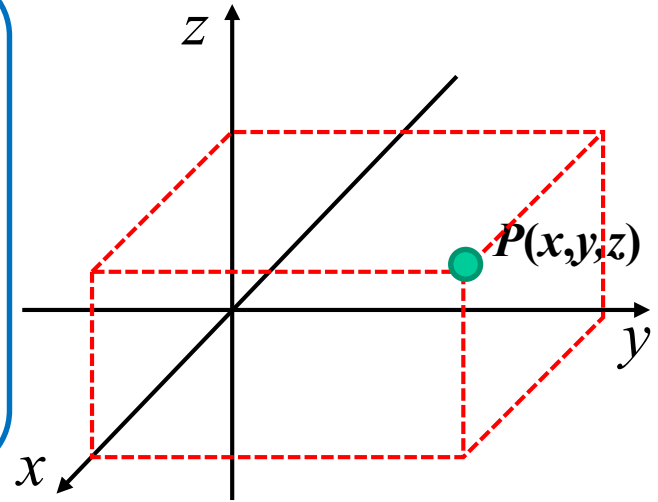
III: $x < 0, y < 0$

IV: $x > 0, y < 0$

- points uniquely defined by an ordered pair

the addition of a rectangular prism with diagonal OP can make it easier to visualise the point's location

Cartesian space



- three axes (x, y and z)
- three coordinate planes (yz, xz and xy) divided into eight octants

I: $x > 0, y > 0, z > 0$ **V:** $x > 0, y > 0, z < 0$

II: $x < 0, y > 0, z > 0$ **VI:** $x < 0, y > 0, z < 0$

III: $x < 0, y < 0, z > 0$ **VII:** $x < 0, y < 0, z < 0$

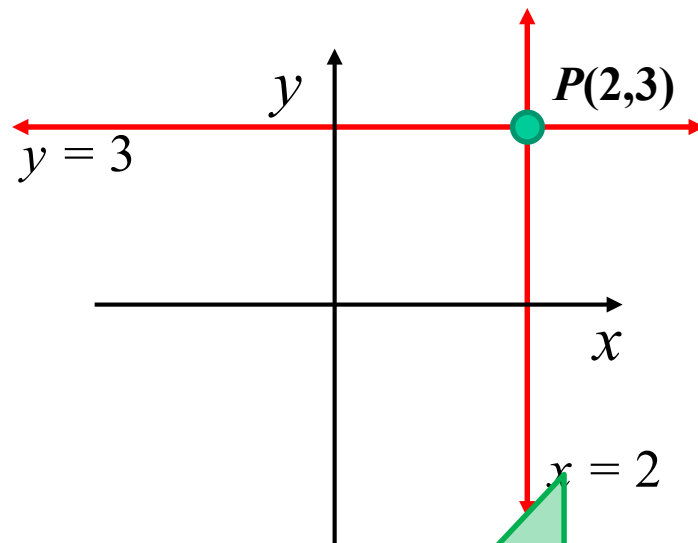
IV: $x > 0, y < 0, z > 0$ **VIII:** $x > 0, y < 0, z < 0$

- points uniquely defined by an ordered triple

lines parallel to coordinate axes

lines parallel to the x axis ($y = c$)

lines parallel to the y axis ($x = k$)

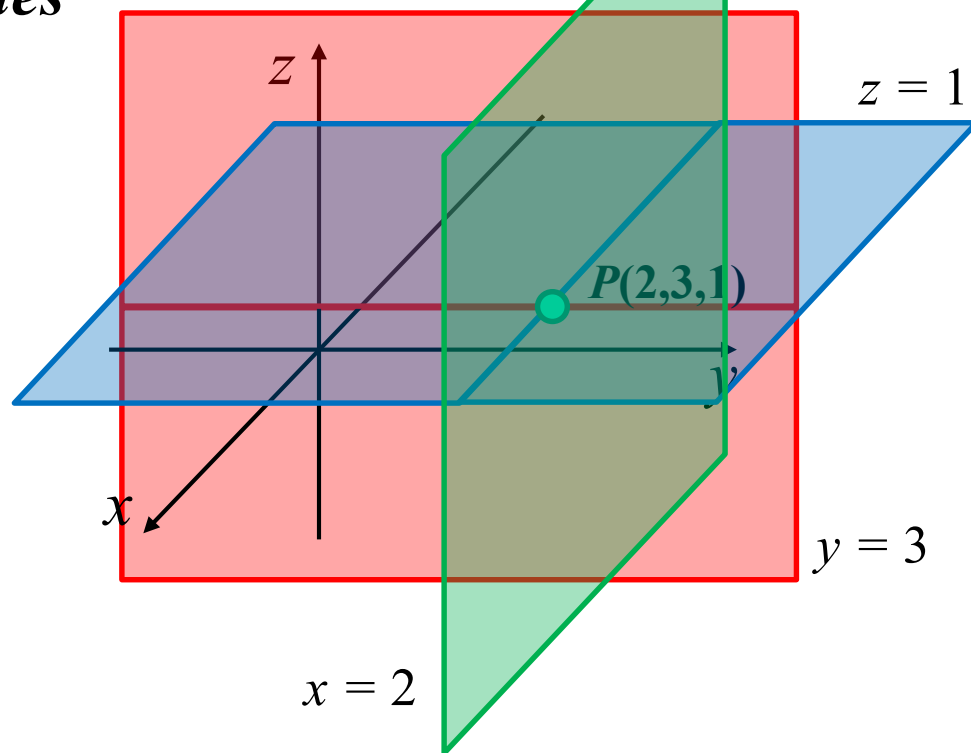


planes parallel to coordinate planes

plane parallel to xy plane ($z = c$)

plane parallel to xz plane ($y = k$)

plane parallel to yz plane ($x = C$)



Distance & Midpoint

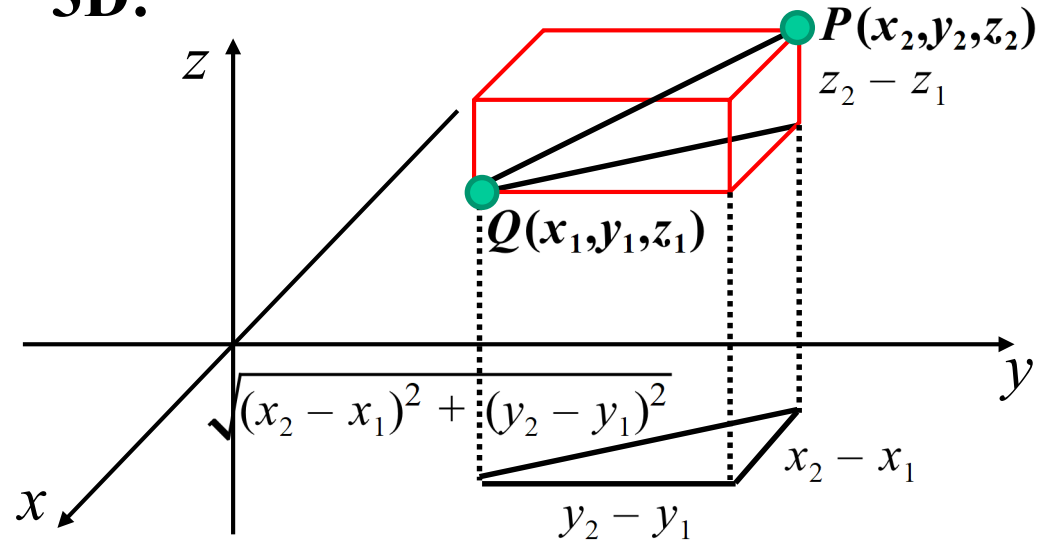
Distance Formula

$$\mathbf{2D: } d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint Formula

$$\mathbf{2D: } M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

3D:



3D:

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2} \right)$$

$$d = \sqrt{\left(\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \right)^2 + (z_2 - z_1)^2}$$

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

**Exercise 5A;
1, 2, 5, 7, 10,
12, 15, 16**