Overview

University of Sawa
College of Engineering Technology

Air Conditioning and Refrigeration Department

First Stage

Lect : Haider Abdl R Jassim

Overview

- Coordinates, points, vectors
- Matrices

*n*D Space

*n*D Space: $\Re^n$ (typically)

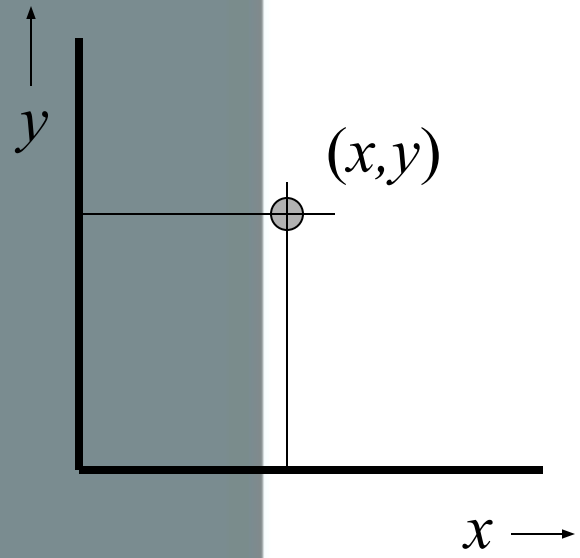
n : number of dimensions

Examples:

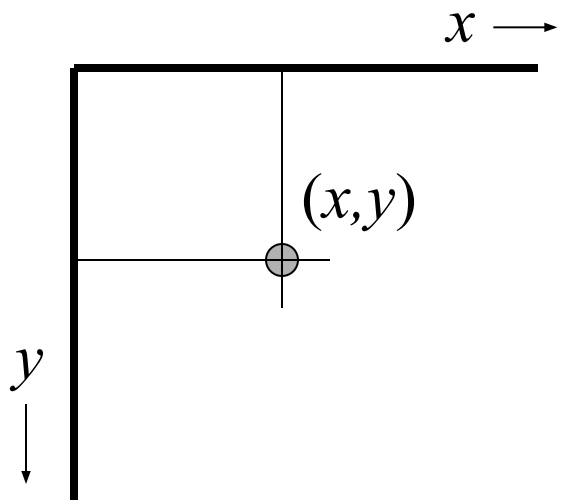
- 1D space: time, along a line or curve
- 2D space: plane, sphere
- 3D space: the world we live in
- 4D space: 3D + time

Coordinates

2D Cartesian coordinates:



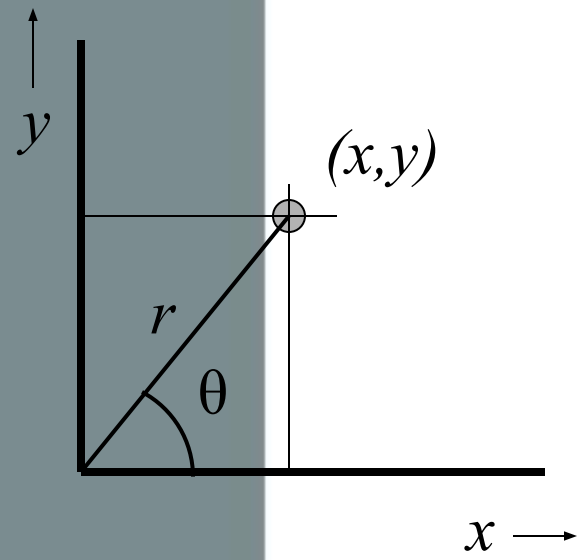
Standard



Screen (output, input)

H&B A-1

Polar coordinates



- Coordinate transformation from (r,θ) to (x,y) space:

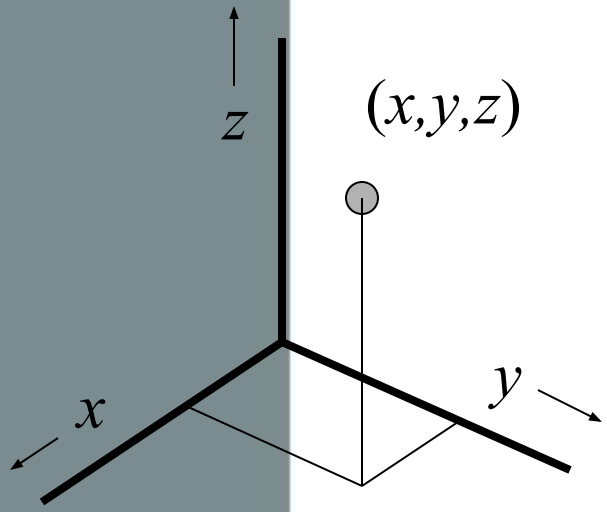
$$x = r\cos\theta$$

$$y = r\sin\theta$$

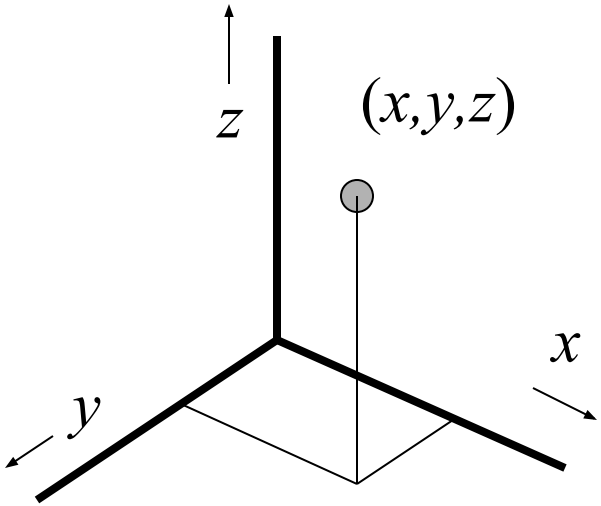
Angle θ : in radians

3D coordinates 1

3D Cartesian coordinates:



Right-handed



Left-handed

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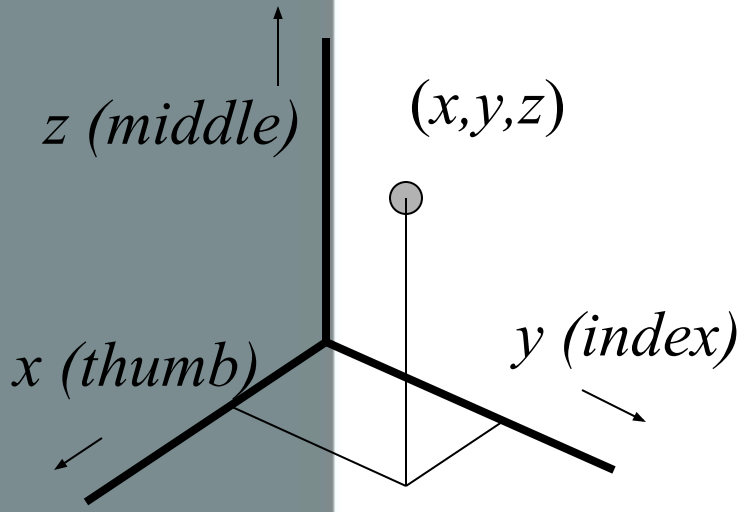
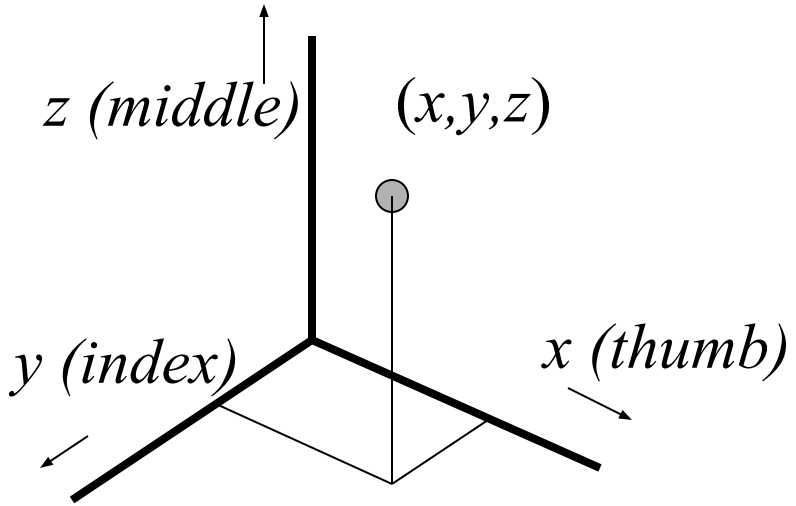
3D coordinates 2

3D Cartesian coordinates:



Right-handed

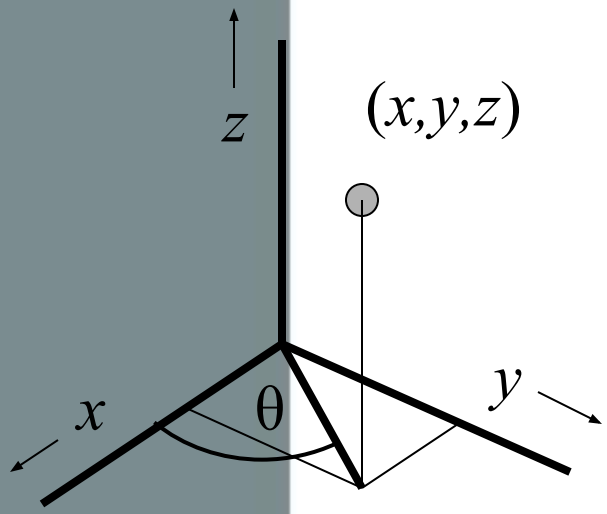


Left-handed

H&B A-1

3D coordinates 3

Cylinder coordinates:



$$x = r\cos\theta$$

$$y = r\sin\theta$$

$$z = z$$

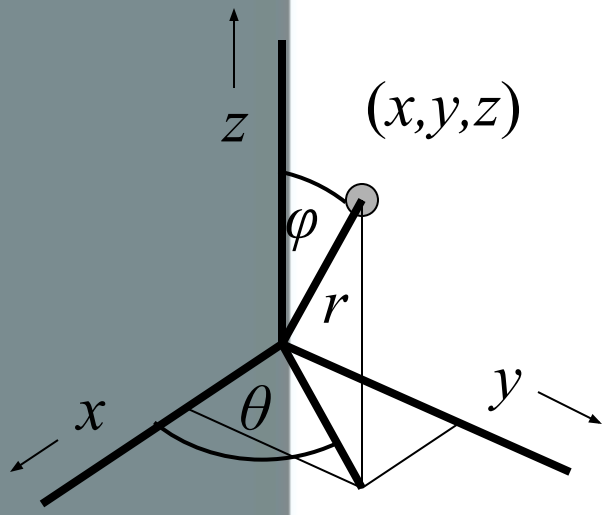
3D coordinates 4

Spherical coordinates:

$$x = r\cos\theta\sin\phi$$

$$y = r\sin\theta\sin\phi$$

$$z = r\cos\phi$$



θ : azimuth or longitude

ϕ : elevation or latitude

Also : $\lambda = \pi / 2 - \phi$

λ : colatitude

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