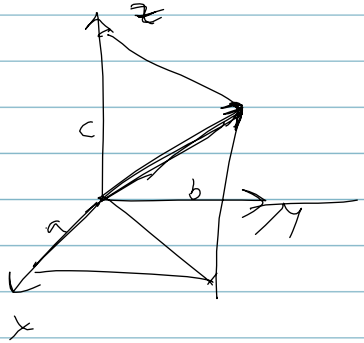
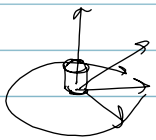
Rotation Matrices



$$a\hat{x} + b\hat{y} + c\hat{z}$$

$$\begin{pmatrix} a \\ b \\ c \end{pmatrix}$$

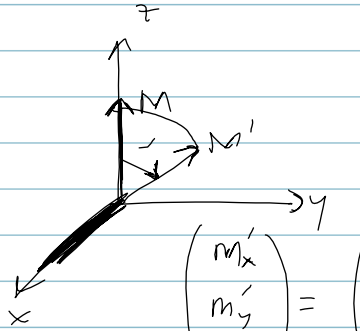
Magnetization vectors



$$\begin{pmatrix} M_x \\ M_y \\ M_z \end{pmatrix}$$

3×3 rotation matrices

§ 2.5



left handed rotation about x-axis, with angle α

$$\begin{pmatrix} m_x' \\ m_y' \\ m_z' \end{pmatrix} = \underbrace{\begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos\alpha & \sin\alpha \\ 0 & -\sin\alpha & \cos\alpha \end{pmatrix}}_{R_x(\alpha)} \begin{pmatrix} M_x \\ M_y \\ M_z \end{pmatrix}$$

textbook

$R_y(\alpha)$, $R_z(\alpha)$, $R_{arbitrary}(\alpha)$

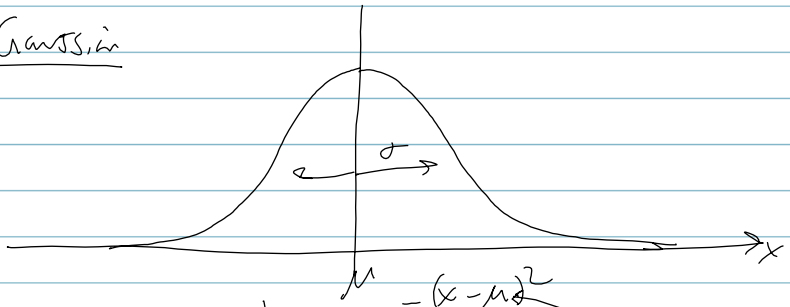
Basic Probability

random variable X — characterized by
cumulative distribution fun (CDF)
probability density function (PDF)

$$F(x) \triangleq Pr\{X < x\}$$

$$f(x) \triangleq \frac{dF(x)}{dx}$$

Gaussian



$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

μ = mean

σ = standard deviation

σ^2 = variance

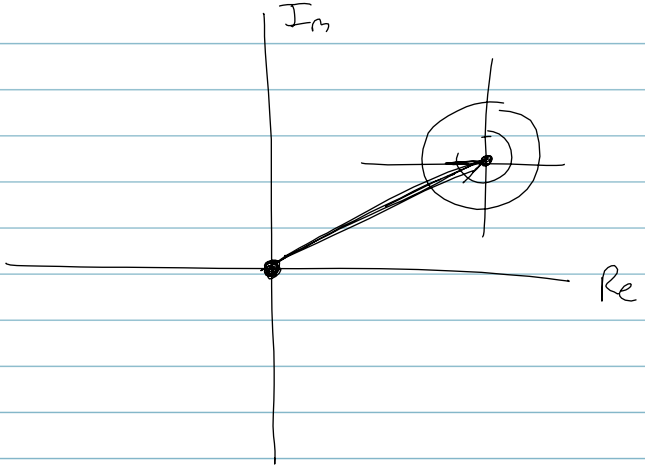
Additive White Gaussian Noise

$$\mathcal{N}[0, \sigma^2]$$

complex valued images

+

complex valued noise



$S = 0 \Rightarrow$ Rayleigh distributed

$S \neq 0 \Rightarrow$ Rician distributed

$S \gg N \Rightarrow \sim$ Gaussian