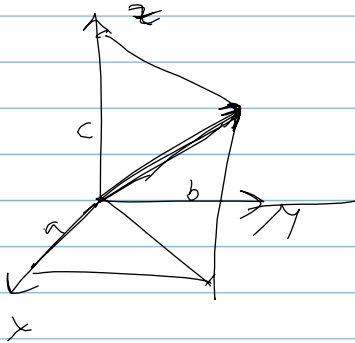


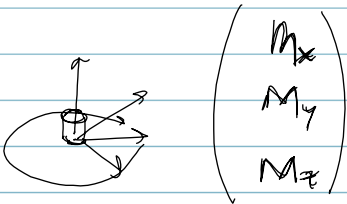
## Rotation Matrices



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

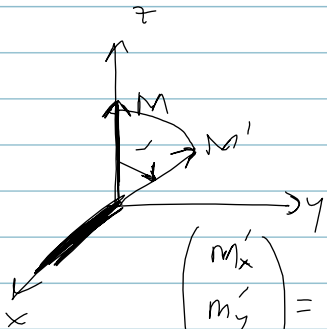
$$\begin{pmatrix} a \\ b \\ c \end{pmatrix}$$

## Magnetization Vectors



3x3 rotation matrices

$$\S 2.5$$



left handed rotation about  
x-axis, with angle  $\alpha$

$$\begin{pmatrix} m'_x \\ m'_y \\ m'_z \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos\alpha & \sin\alpha \\ 0 & -\sin\alpha & \cos\alpha \end{pmatrix} \begin{pmatrix} m_x \\ m_y \\ m_z \end{pmatrix}$$

textbook

$R_x(\alpha)$

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

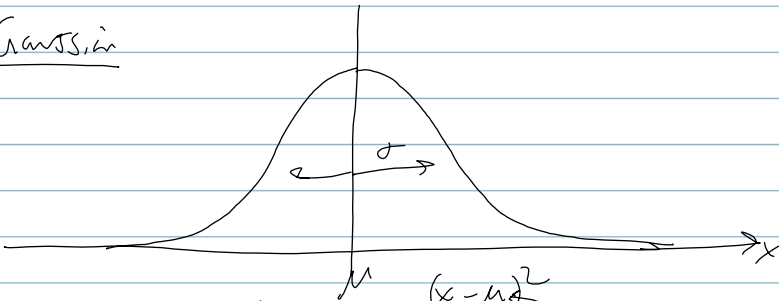
## Bayes Probability

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

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

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

## Gaussian



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

$\mu = \text{mean}$

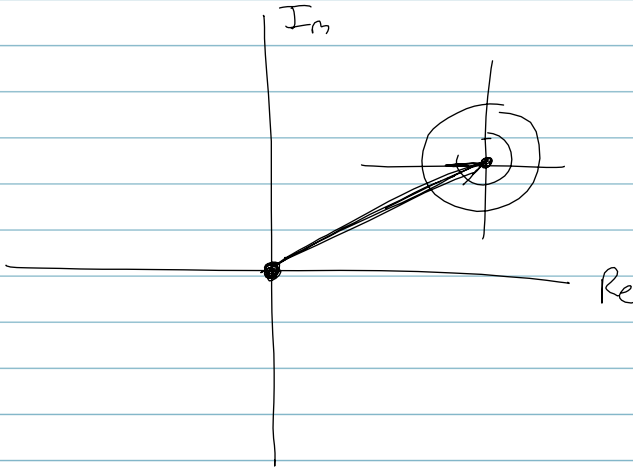
$\sigma = \text{standard deviation}$

$\sigma^2 = \text{variance}$

## Additive White Gaussian Noise

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

complex valued signal  
+  
complex valued noise



$S = 0 \Rightarrow$  Rayleigh distributed

$S \neq 0 \Rightarrow$  Rician distributed

$S \gg N \Rightarrow \sim$  Gaussian