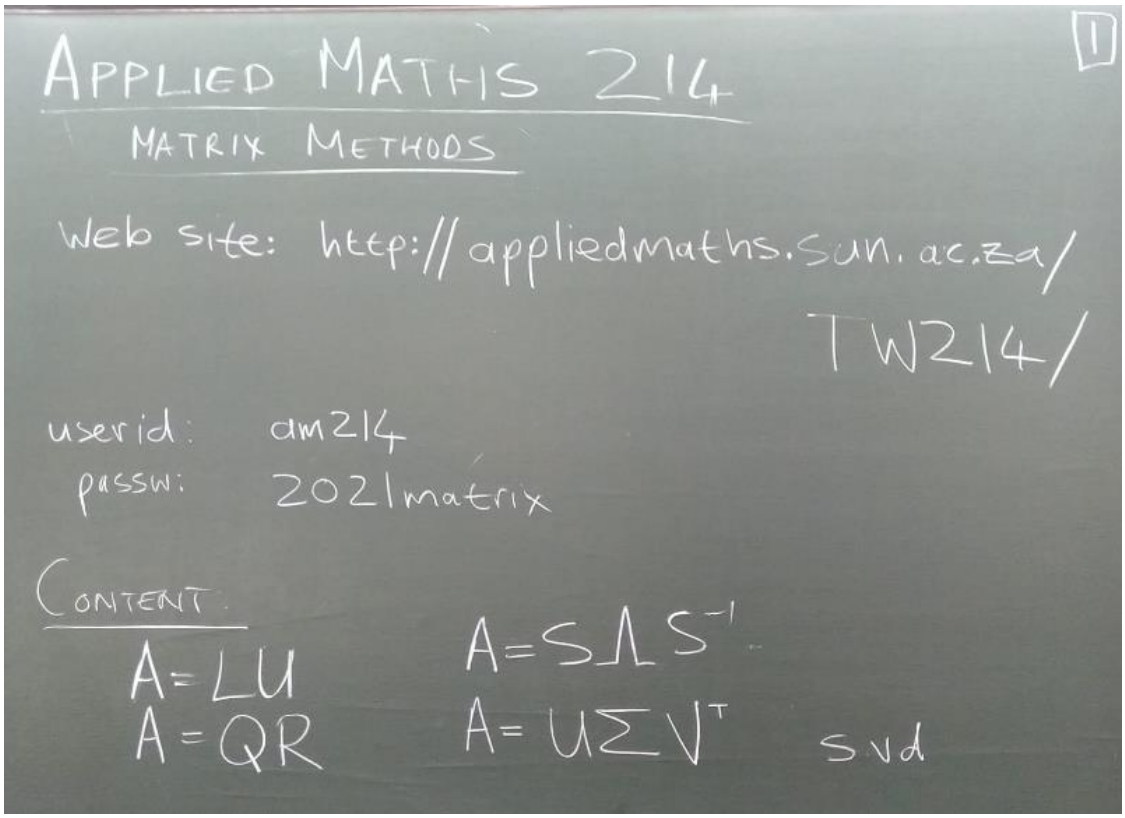
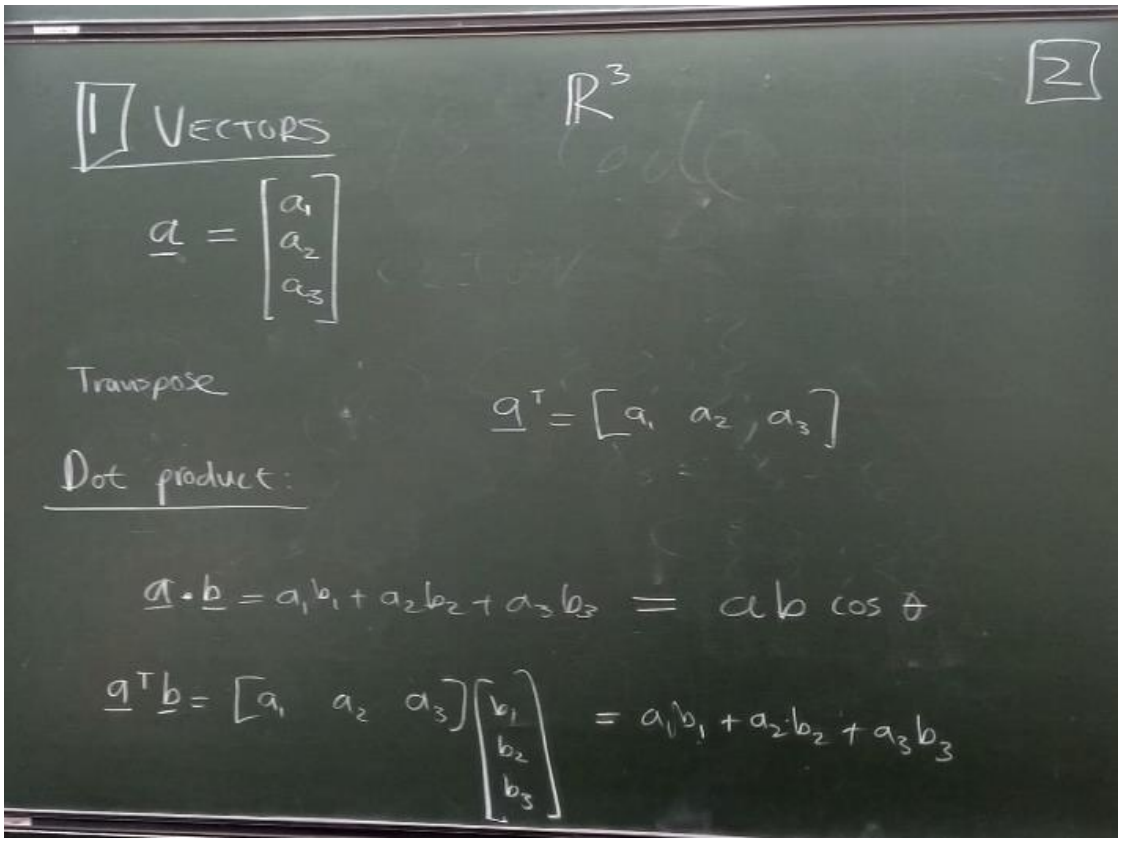
**AM214-2023: LECTURE 1**



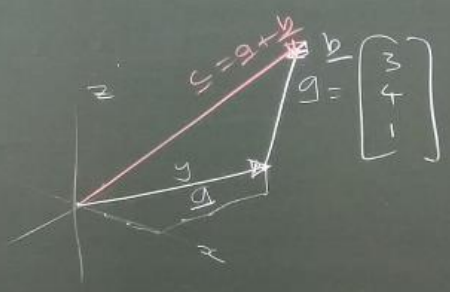



3

$\underline{b}^T\underline{a} = \underline{a}^T\underline{b} = \underline{a} \cdot \underline{b}$

$\underline{c} = \underline{a} + \underline{b}$

$$\begin{bmatrix} 3 \\ 4 \\ 1 \end{bmatrix} + \begin{bmatrix} -1 \\ 2 \\ 4 \end{bmatrix} = \begin{bmatrix} 2 \\ 6 \\ 5 \end{bmatrix}$$




$$\underline{b} = \begin{bmatrix} 3 \\ 4 \\ 1 \end{bmatrix}$$

$\underline{b} = \lambda \underline{a}$

$$\underline{a} = a_1\underline{i} + a_2\underline{j} + a_3\underline{k} = a_1\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} + a_2\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix} + a_3\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

4

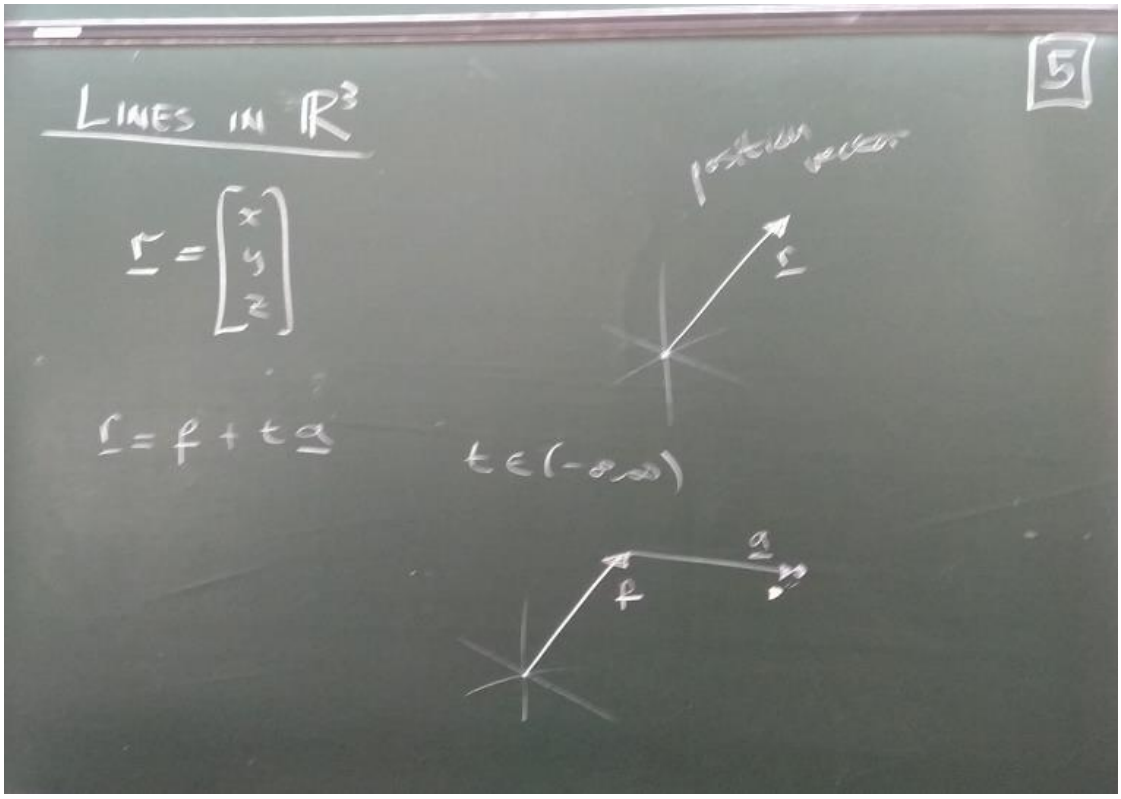
$$= \begin{bmatrix} a_1 \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} 0 \\ a_2 \\ 0 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ a_3 \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix}$$

Norm:

$$\underline{a} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} \qquad \|\underline{a}\| = \sqrt{a_1^2 + a_2^2 + a_3^2} = a$$

$\|\underline{a}\|^2 = \underline{a}^T\underline{a}$

$\hat{\underline{a}} = \frac{1}{a}(\underline{a}) = \frac{\underline{a}}{a}$


5
LINES IN $\mathbb{R}^3$
$\underline{r} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$
position vector
$\underline{r}$
$\underline{r} = \underline{f} + t\underline{a}$
$t \in (-\infty, \infty)$
$\underline{a}$
$\underline{f}$