

\mathbb{R}^3) $\mathcal{O}(3)$

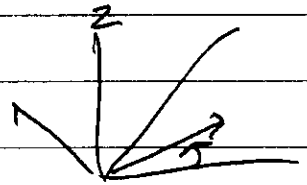
rotation about the z -axis

$$z' = z$$

$$x' = x \cos \varphi - y \sin \varphi$$

$$y' = x \sin \varphi + y \cos \varphi$$

$$\Rightarrow R_z(\varphi) = \begin{pmatrix} \cos \varphi & -\sin \varphi & 0 \\ \sin \varphi & \cos \varphi & 0 \\ 0 & 0 & 1 \end{pmatrix}$$



Rotation about y -axis

$$R_y(\varphi) = \begin{pmatrix} \cos \varphi & 0 & -\sin \varphi \\ 0 & 1 & 0 \\ \sin \varphi & 0 & \cos \varphi \end{pmatrix}$$

Rotation about the x -axis

$$R_x(\varphi) = \begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos \varphi & -\sin \varphi \\ 0 & \sin \varphi & \cos \varphi \end{pmatrix}$$