

FORMULAIRE SUR LES REPÈRES MOBILES DE $\mathbb{R}^3$

	Coordonnées cartésiennes	Coordonnées cylindriques	Coordonnées sphériques
Point P	$(x, y, z) \quad x, y, z \in \mathbb{R}$	$(\rho, \theta, z) \quad \begin{cases} \rho \geq 0 \\ \theta \in [0, 2\pi[\\ z \in \mathbb{R} \end{cases}$	$(r, \theta, \varphi) \quad \begin{cases} r \geq 0 \\ \theta \in [0, 2\pi[\\ \varphi \in]-\frac{\pi}{2}, \frac{\pi}{2}[\end{cases}$
Chang. coordonnées	$\begin{cases} \rho = \sqrt{x^2 + y^2} \\ \theta = \begin{cases} \arctan \frac{x}{y} & \text{si } x > 0 \\ \frac{\pi}{2} & \text{si } x = 0 \\ \arctan \frac{x}{y} + \pi & \text{si } x < 0 \end{cases} \\ z = z \end{cases}$ $\begin{cases} r = \sqrt{x^2 + y^2 + z^2} \\ \theta = \text{idem} \\ \varphi = \arcsin \frac{z}{\sqrt{x^2 + y^2 + z^2}} \end{cases}$	$\begin{cases} x = \rho \cos \theta \\ y = \rho \sin \theta \\ z = z \end{cases}$ $\begin{cases} r = \sqrt{\rho^2 + z^2} \\ \theta = \theta \\ \varphi = \arcsin \frac{z}{\sqrt{\rho^2 + z^2}} \end{cases}$	$\begin{cases} x = r \cos \theta \cos \varphi \\ y = r \sin \theta \cos \varphi \\ z = r \sin \varphi \end{cases}$ $\begin{cases} \rho = r \cos \varphi \\ \theta = \theta \\ z = r \sin \varphi \end{cases}$
Repère en P	$(P; \vec{i}, \vec{j}, \vec{k}) \quad \begin{cases} \vec{i} = \frac{\partial}{\partial x} \\ \vec{j} = \frac{\partial}{\partial y} \\ \vec{k} = \frac{\partial}{\partial z} \end{cases}$	$(P; \vec{e}_\rho, \vec{e}_\theta, \vec{k}) \quad \begin{cases} \vec{e}_\rho = \frac{\partial}{\partial \rho} \\ \vec{e}_\theta = \frac{1}{\rho} \frac{\partial}{\partial \theta} \\ \vec{k} = \frac{\partial}{\partial z} \end{cases}$	$(P; \vec{e}_r, \vec{e}_\theta, \vec{e}_\varphi) \quad \begin{cases} \vec{e}_r = \frac{\partial}{\partial r} \\ \vec{e}_\theta = \frac{1}{r \cos \varphi} \frac{\partial}{\partial \theta} \\ \vec{e}_\varphi = \frac{1}{r} \frac{\partial}{\partial \varphi} \end{cases}$
Chang. repères	$\begin{cases} \vec{e}_\rho = \cos \theta \vec{i} + \sin \theta \vec{j} \\ \vec{e}_\theta = -\sin \theta \vec{i} + \cos \theta \vec{j} \\ \vec{k} = \vec{k} \end{cases}$ $\begin{cases} \vec{e}_r = \cos \theta \cos \varphi \vec{i} + \sin \theta \cos \varphi \vec{j} + \sin \varphi \vec{k} \\ \vec{e}_\theta = -\sin \theta \vec{i} + \cos \theta \vec{j} \\ \vec{e}_\varphi = -\cos \theta \sin \varphi \vec{i} - \sin \theta \sin \varphi \vec{j} + \cos \varphi \vec{k} \end{cases}$	$\begin{cases} \vec{i} = \cos \theta \vec{e}_\rho - \sin \theta \vec{e}_\theta \\ \vec{j} = \sin \theta \vec{e}_\rho + \cos \theta \vec{e}_\theta \\ \vec{k} = \vec{k} \end{cases}$ $\begin{cases} \vec{e}_r = \cos \varphi \vec{e}_\rho + \sin \varphi \vec{k} \\ \vec{e}_\theta = \vec{e}_\theta \\ \vec{e}_\varphi = -\sin \varphi \vec{e}_\rho + \cos \varphi \vec{k} \end{cases}$	$\begin{cases} \vec{i} = \cos \theta \cos \varphi \vec{e}_r - \sin \theta \vec{e}_\theta - \cos \theta \sin \varphi \vec{e}_\varphi \\ \vec{j} = \sin \theta \cos \varphi \vec{e}_r + \cos \theta \vec{e}_\theta - \sin \theta \sin \varphi \vec{e}_\varphi \\ \vec{k} = \sin \varphi \vec{e}_r + \cos \varphi \vec{e}_\varphi \end{cases}$ $\begin{cases} \vec{e}_\rho = \cos \varphi \vec{e}_r - \sin \varphi \vec{e}_\varphi \\ \vec{e}_\theta = \vec{e}_\theta \\ \vec{k} = \sin \varphi \vec{e}_r + \cos \varphi \vec{e}_\varphi \end{cases}$