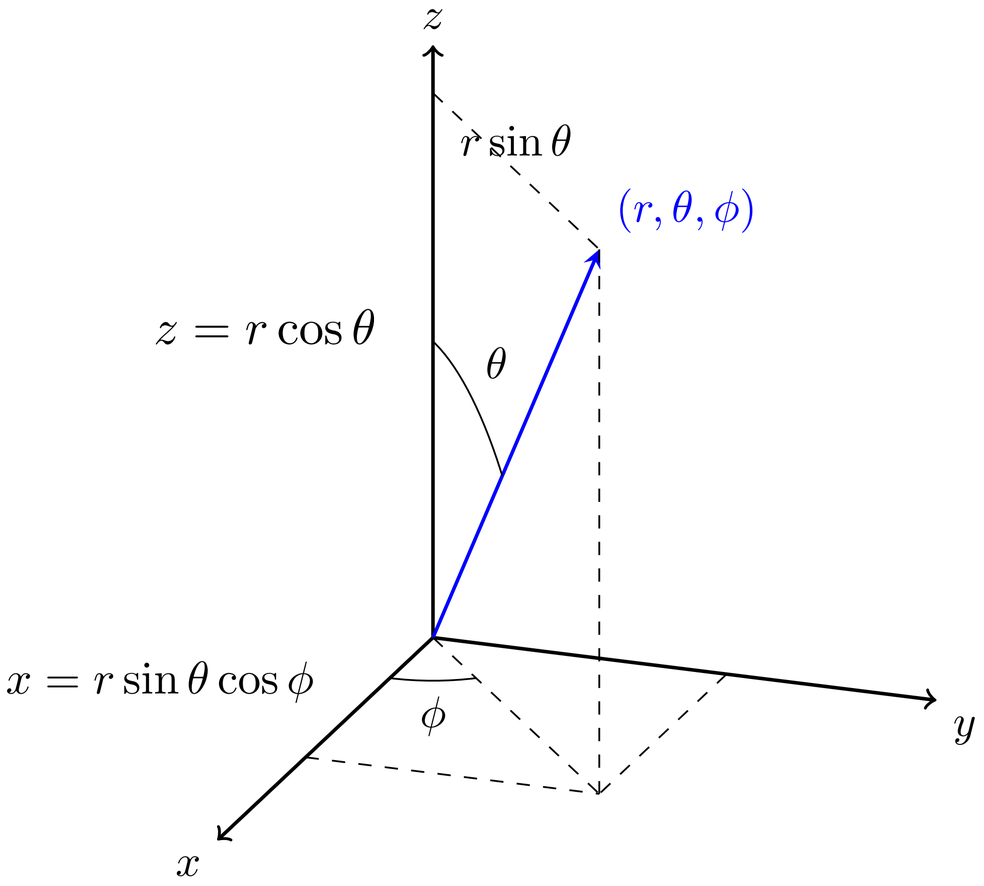
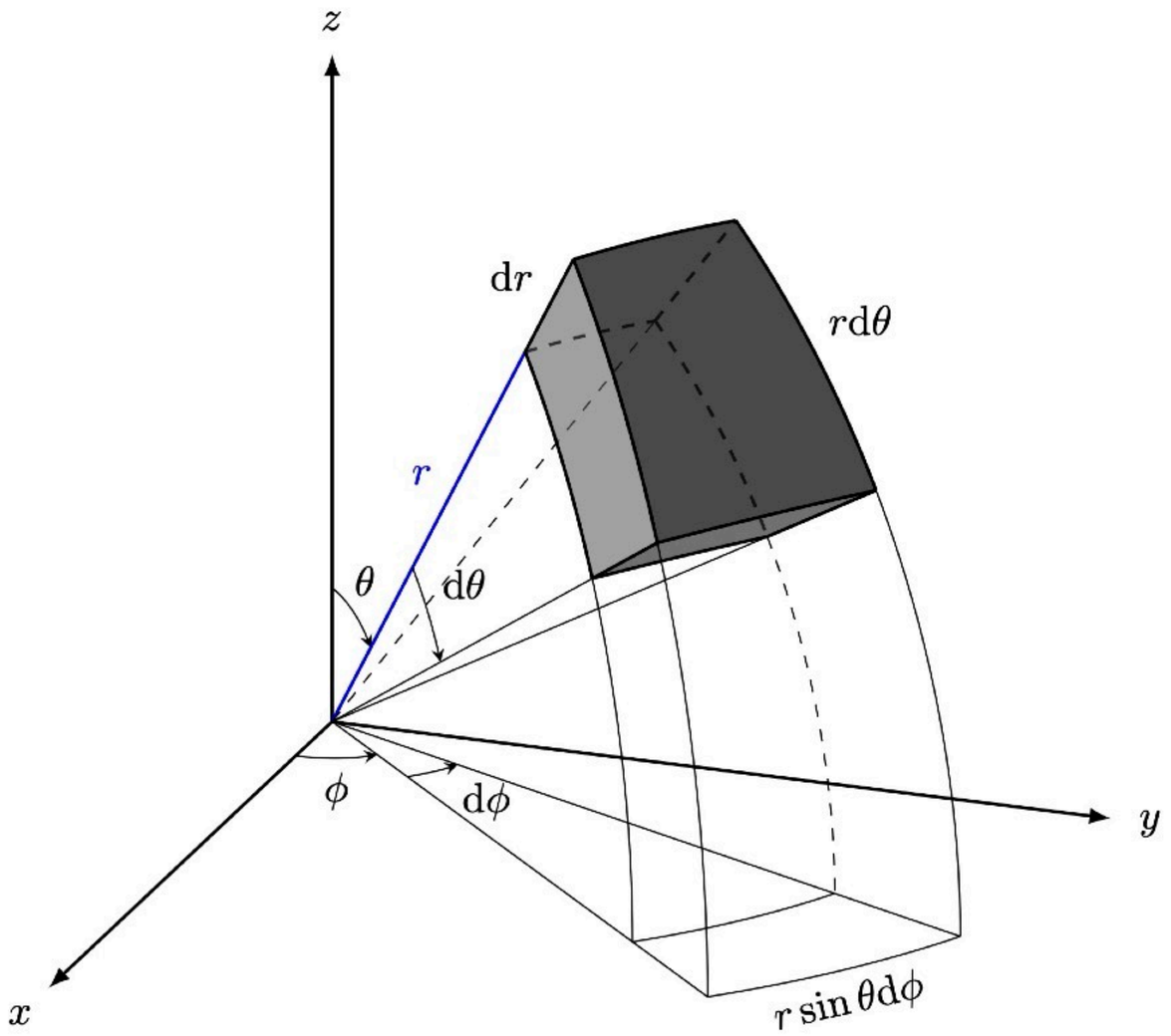
Spherical Coordinates



$$
\begin{aligned}
x &= r\sin\theta\cos\phi \\
y &= r\sin\theta\sin\phi \\
z &= r\cos\theta
\end{aligned}
$$

Spherical Coordinates



Volume and area elements

$$\begin{aligned} dV =& \mathrm{d}A\,\mathrm{d}r = (r\mathrm{d}\theta)\,(r\sin\theta\mathrm{d}\phi)\,(\mathrm{d}r) \\ =& r^2\sin\theta\,\mathrm{d}r\mathrm{d}\theta\mathrm{d}\phi \end{aligned}$$

$$\begin{aligned} \mathrm{d}A =& (r\mathrm{d}\theta)(r\sin\theta\mathrm{d}\phi) \\ =& r^2\sin(\theta)\,\mathrm{d}\theta\mathrm{d}\phi \end{aligned}$$