

## Exercise 1

Show that

$$\int_0^{2\pi} \int_0^\pi \boldsymbol{\delta}_r \sin \theta \, d\theta \, d\phi = 0$$
$$\int_0^{2\pi} \int_0^\pi \boldsymbol{\delta}_r \boldsymbol{\delta}_r \sin \theta \, d\theta \, d\phi = \frac{4}{3}\pi \boldsymbol{\delta}$$

where  $\boldsymbol{\delta}_r$  is the unit vector in the  $r$  direction in spherical coordinates.