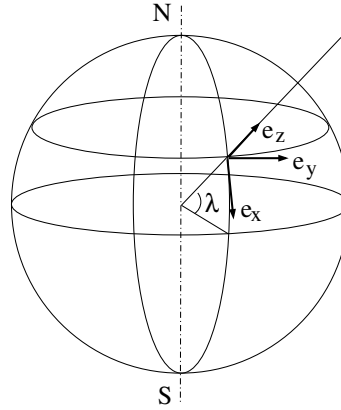


**[mex61] Effect of Coriolis force on falling object**

Consider a location at northern latitude  $\lambda$  on the Earth's surface. A particle of mass  $m$  starts falling from rest at position  $\mathbf{r}_0 = (0, 0, h)$  in the local coordinate system with axes as shown in the figure. (a) Determine the position  $\mathbf{r}(t) = (x(t), y(t), z(t))$  during the fall. Perform the calculation to leading order in  $\omega$ , the Earth's angular velocity of rotation. (b) If  $h = 100\text{m}$ ,  $g = 9.8\text{m/s}^2$  and  $\lambda = 45^\circ$ , what is the magnitude and direction of horizontal deflection from the vertical line of the point where the particle hits the ground.



**Solution:**