Q1. Evaluate the iterated integral

\[ \int_0^4 \left( \int_0^2 \frac{1}{\sqrt{y^3 + 1}} \right) dy \, dx \]

Q2. Integrate the function \( f(x, y, z) = 2xy \) over the solid \( E \) that lies under the plane \( z = 1 + x + y \) and above the region in the \( xy \)-plane bounded by the curves \( y = \sqrt{x} \), \( y = 0 \) and \( x = 1 \).
Q3 Evaluate \( \iiint_E (x^2 + y^2) \, dV \) where \( E \) is the region bounded above by the sphere \( x^2 + y^2 + z^2 = 1 \) and below by the cone \( z = \frac{1}{\sqrt{3}} \sqrt{x^2 + y^2} \)

Q4 Find the volume, in the first octant, of the solid inside both the hemisphere \( z = \sqrt{16 - x^2 - y^2} \) and the cylinder \( x^2 + y^2 - 4x = 0 \).