Data Interpolation and Representation

1. Trilinear Interpolation
   Suppose you have the following sampled data.
   \[
   \begin{array}{cc}
   f(0,0,0) = 3 & f(0,0,1) = 2 \\
   f(1,0,0) = 1 & f(1,0,1) = 10 \\
   f(0,1,0) = 4 & f(0,1,1) = 24 \\
   f(1,1,0) = 8 & f(1,1,1) = 0 \\
   \end{array}
   \]
   Using trilinear interpolation, what is the value of \( f(1/2, 1/2, 4/5) \)?

2. Barycentric Coordinates
   Assuming the following points are given in barycentric coordinates using the three vertices of a triangle \( \Delta abc \), which point lies on an edge of the triangle but not at a corner?
   a. \((0,0,1)\)
   b. \((-1/2, 3/2, 0)\)
   c. \((1/3, 2/3, 0)\)
   d. \((1/2, 1/4, 1/4)\)
3. **Uniform Grid**

You have sampled scalar data at the grid vertices of a structured grid in 3-dimensional Euclidean space ($\mathbb{R}^3$). The grid has $n$ cells along each axis for a total of $n^3$ cells. How many bytes of storage will the data structure require to specify the grid and data? Assume that all numbers, integer or floating point, require 4 bytes.