CS 519: Scientific Visualization Fall 2017
In-class Worksheet 1

Linear Interpolation and Data Representation

1. Trilinear Interpolation

Suppose you have the following sampled data.

f(0,0,0)= 3	f(0,0,1)= 2
f(1,0,0)=19	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

Using trilinear interpolation, what is the value of f(1/4 ,1/2, 4/5)?

2. Barycentric Coordinates

Assuming the following points are given in barycentric coordinates using the three vertices of a triangle Δabc, 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. Structured Grid

You have sampled scalar data at the grid vertices of a structured grid in 3-dimensional Euclidean space (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.