

**2012.2 Advanced Computer Graphics (Take-Home Exam)**

Student ID : ( \_\_\_\_\_ ) , Name : ( \_\_\_\_\_ )

※ Please write the answer for each problem and submit it to me during the class on Oct 30th. You may use additional A4 paper if you need more space to write answers.

※ You may answer either in Korean or in English.

※ You must do this exam by yourself. Do not share the answers with other students.

1. (a) Explain in detail the definition of “Hausdorff Distance” that is used for measuring the difference between two surfaces A and B.

( \_\_\_\_\_ )

(b) Explain in detail an algorithm for mesh simplification based on edge contraction.

( \_\_\_\_\_ )

(c) The mesh simplification algorithm based on edge contraction often require using priority queue. Explain in detail (i) what the “priority queue” is, and (ii) why the priority queue is necessary in the algorithm.

( \_\_\_\_\_ )

(d) Create your own algorithm for mesh simplification and explain it in detail.

( \_\_\_\_\_ )

2. Z-buffering is very commonly used for solving visibility problem in computer graphics.

(a) Explain the structure of z-buffer, and explain what is stored in the z-buffer.

( \_\_\_\_\_ )

(b) Explain in detail z-buffering algorithm.

( \_\_\_\_\_ )

(c) Explain the advantages of using z-buffering algorithm compared to other visibility techniques.

( \_\_\_\_\_ )

3. (a) What is trilinear interpolation?

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(b) When using mipmapping, trilinear interpolation method can be applied. Explain in detail how trilinear interpolation is performed. That means, how do you determine the pixel color on a point of texture mapped surface if mipmapping and trilinear interpolation method are applied? Explain also the effect of trilinear interpolation in mipmapping.

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(c) Trilinear interpolation is necessary during the process of volume rendering. Why is it necessary? Explain in detail.

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4. (a) Terrain is often represented as a “height map”. What is height map?

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(b) We need a mesh representation of a terrain for rendering purpose. How can we convert the height map into the mesh representation. Explain.

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(c) Height map representation and conversion to mesh representation often causes a serious problem in terrain visualization. (i) What is the serious problem, and (ii) what techniques can be used for solving the problem. Explain in detail.

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5. (a) What is the mathematical definition of an isosurface.

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(b) Marching Cubes (MC) is a very famous method. (i) What are input of MC method?, and (ii) What are output of MC method?

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(c) Explain MC algorithm. Your answer should contain full details of MC algorithm.

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