

Assignment 3
Modeling for Computer Graphics
Due Date: December 9, 2011
Total Marks:100

- 1 (20 marks) Consider a mesh with e edges, v vertices and f faces. Based on these values, compute the number of faces, vertices and edges after one level of subdivision in the cases of Doo-Sabin and Loop methods. Show your calculations. The mesh doesn't have any boundaries.
- 2 (15 marks) Consider a simple row of pixel intensities: $[20, 16, 12, 20, 24, 24, 20, 8]$. Find Haar wavelets transform of data after two steps.
- 3 (15 marks) Derive the subdivision masks of Catmull-Clark subdivision for a regular quad mesh.
- 4 (30 marks) Write a Pseudocode for reducing the resolution of a one dimensional array $F[1, m]$ using A (reverse subdivision matrix) of cubic B-spline subdivision. This algorithm should be $O(m)$ (linear in term of m). what is the condition on m to be able to repeat successively this algorithm for three times(three levels of decompositions)?
- 5 (20 marks) In the following expressions A, B, C, D and E denote the primitives. If F_A, F_B, F_C, F_D and F_E denote their implicit functions, find the composite implicit function for the expressions:
 1. $((A - B) \cap (C \cup D)) \cap E$
 2. $((A \cup B) \cap (C \cap D)) - E$