

University of Utah

School of Computing

CS 6220

Assignment #4

Spring 2016

Due At The Start of Class Tuesday April 19, 5:00PM, 2016

Answer the following questions (taken from the text with some modifications). For the computational problems, your write-up should be in the “assignment report” format described in the syllabus. Please keep your answer to **15** single-column pages.

1. Page 132 # 4 (a)-(c).
2. Page 132 # 4 (d). For your computational experiments, take $a(x) = 1.0 + e^x$ and $q(x) = \pi^2 \sin(\pi x)$. Compare using a uniform mesh with element spacings of $\frac{1}{20}$, $\frac{1}{40}$, $\frac{1}{80}$ and $\frac{1}{160}$ and a set of four non-uniform meshes generated by golden ratio subdivision. To generate your non-uniform meshes, your base mesh should be a uniform mesh with a spacing of $\frac{1}{20}$. Let a depth-1 subdivision be the splitting of these 20 elements into 40 elements using the golden ratio partitioning on each element. Recursively design your four non-uniform meshes from depth-1 to depth-4. Comment on your results.
3. Page 133 # 5 (b). Write a one-dimensional FEM solver based upon the procedure given in class and repeat the computational experiment above. Comment on your results (and the comparison with the previous problem).