**ECE 6380**

**Homework 8**

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| Problem 8.1 | | | | | | | | |
| # layers | # nodes inner | # nodes outer | Side length (h) | Calculated C/ε0 | Error | h2 \*0.002 | h3 \* 0.002 | h4 \* 0.002 |
| 2 | 12 | 20 | 1.3299 | 4.5437 | 0.00249316 | 0.00353727 | 0.00470421 | 0.00625613 |
| 3 | 20 | 32 | 0.8757 | 4.5354 | 0.0006619 | 0.0015337 | 0.00134306 | 0.00117612 |
| 4 | 28 | 40 | 0.6544 | 4.5335 | 0.0002427 | 0.00085648 | 0.00056048 | 0.00036678 |
| 5 | 36 | 48 | 0.5228 | 4.5329 | 0.00011032 | 0.00054664 | 0.00028578 | 0.00014941 |
|  |  |  |  |  |  |  |  |  |
|  |  |  | exact | 4.5324 |  |  |  |  |

From the problem above, O(hn) should fall between 3 < n < 4. The scaled h3 function will eventually converge with error, and h4 diverges from error.

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| Problem 8.2 | | |
| **Mesh 1**  2 layers  12 inner nodes | **Mesh 2**  3 layers  20 inner nodes | **Mesh 3**  4 layers  28 inner nodes |
| 1 1.0271015176589 0  2 1.1179854717039 0  3 1.1179854717039 0  4 1.3404817504715 0  5 1.3432779283988 0  6 1.6229951314608 0  7 1.6229951314608 0  8 1.9212914945409 0  9 1.9271434897002 0  10 2.1045506610286 0  11 2.1678803493196 0  12 2.1678803493196 0  13 2.2390831206298 0  14 2.2390831206298 0 | 1 1.0249886412756 0  2 1.113313720582 0  3 1.113313720582 0  4 1.3323689761294 0  5 1.3330276276498 0  6 1.6106299717152 0  7 1.6106299717152 0  8 1.9061621461324 0  9 1.9065345780001 0  10 2.0992337679223 0  11 2.1569033155741 0  12 2.1569033155741 0  13 2.2051958845648 0  14 2.2051958845648 0 | 1 1.0246080650488 0  2 1.1123812581293 0  3 1.1123812581294 0  4 1.3308141185726 0  5 1.3310309775164 0  6 1.6079893662642 0  7 1.6079893662642 0  8 1.901851304205 0  9 1.9019115638934 0  10 2.0872922087435 0  11 2.1419857040573 0  12 2.1419857040573 0  13 2.1974116315464 0  14 2.1974116315464 0 |