**ECE 6380 – Homework 3**

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| --- | --- | --- | --- | --- | --- |
| Problem 3.1 | | | | | |
| # layers | # nodes inner boundary | # nodes outer boundary | Unknowns | Calculated C/ε0 | Values from Note 3, Table 1 |
| 2 | 12 | 20 | 16 | 9.3120 | 9.3120 |
| 3 | 20 | 32 | 52 | 9.1638 | 9.1638 |
| 4 | 28 | 40 | 96 | 9.1180 | 9.1180 |
| 5 | 36 | 48 | 152 | 9.0980 | 9.0980 |
|  |  |  |  |  |  |
|  |  |  | exact | 9.0647 |  |

Modified code for Problem 3.1 is attached.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Problem 3.2 | | | | | | | | |
| # layers | # nodes inner boundary | # nodes outer boundary | Average side length | Calc. C/ε0 | Error | Ratio of error +1 layer | Ratio of h plus 1 layer | Ratio of h^2 plus 1 layer |
| 2 | 12 | 20 | 0.3347 | 4.8333 | 0.06638 | 1.71550 | 1.3130 | 1.72413 |
| 3 | 20 | 32 | 0.2549 | 4.7078 | 0.03869 | 2.18430 | 1.5561 | 2.42165 |
| 4 | 28 | 40 | 0.1638 | 4.6127 | 0.01771 | 1.54423 | 1.2522 | 1.56823 |
| 5 | 36 | 48 | 0.1308 | 4.5844 | 0.01147 |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | exact | 4.5324 |  |  |  |  |

The plot above shows that the error follows O(h^2) as more layers of cells are used, where h is the average side length of a cell.