**1.1**

Homogenous Dirichlet:

A screenshot of a cell phone

Description automatically generated

Inhomogenous Dirichlet:

A screenshot of a cell phone

Description automatically generated

**1.2**

A close up of a map

Description automatically generatedb.)

Mesh 4 (left) gives an absolute error of |u(3.25)-48.8679|=0.0562 < 0.1

Mesh 3 gave an absolute error of |u(3.25)-49.0278|=0.216 > 0.1

So, Mesh 4 is the first mesh that gives the desired accuracy with 32 elements in the mesh.

c.)

Absolute/Log error of meshes:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Mesh 1 | Mesh 2 | Mesh 3 | Mesh 4 | Mesh 5 | Mesh 6 |
| Absolute | 2.3102 | 0.7667 | 0.2161 | 0.0562 | 0.0142 | 0.0035 |
| Log | 0.8373 | -0.2657 | -1.5320 | -2.8788 | -4.2545 | -5.6550 |

Slope = 2.6073

A close up of a map

Description automatically generated

d.)

A close up of a map

Description automatically generated

The unstructured mesh gives an absolute error of |u(3.25)-48.8576|=0.0459

This is less than the absolute error given by Mesh 4 (0.0562). This is interesting, given that the unstructured mesh uses only 10 elements while Mesh 4 uses 32 elements. This is interesting, as it shows the benefits of using unstructured meshes over simply increasing the number of elements (and the finite-element method in general).

Unstructured Mesh

e.)