

Non-Linear FEA Assignment 1

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Date - 02/01/2023

Question 4.5

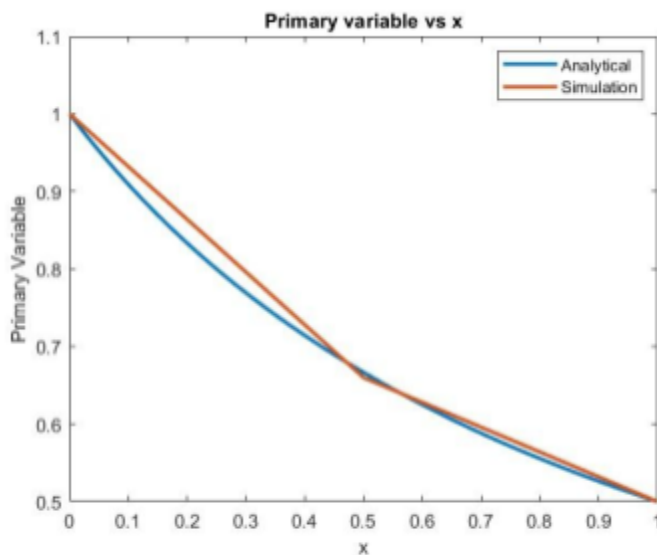
Direct Iteration

Linear Elements

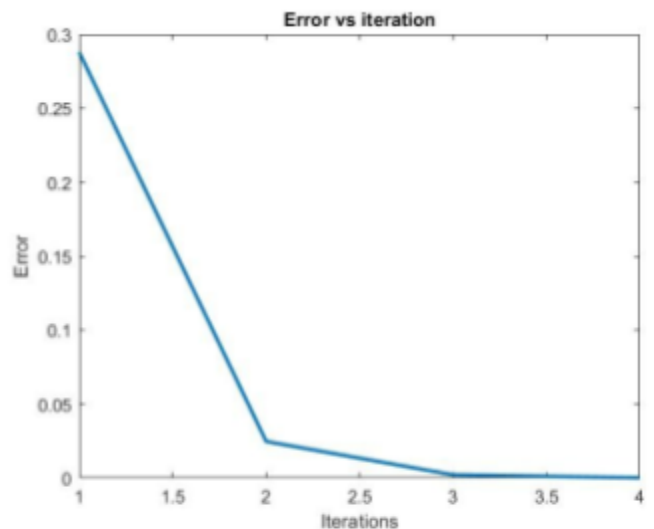
- 2 Element

Node No.	Global Coordinate of Node	Primary Variable
1	0	1
2	0.5	0.6602
3	1	0.5

Number of iterations - 4



Primary variable vs x

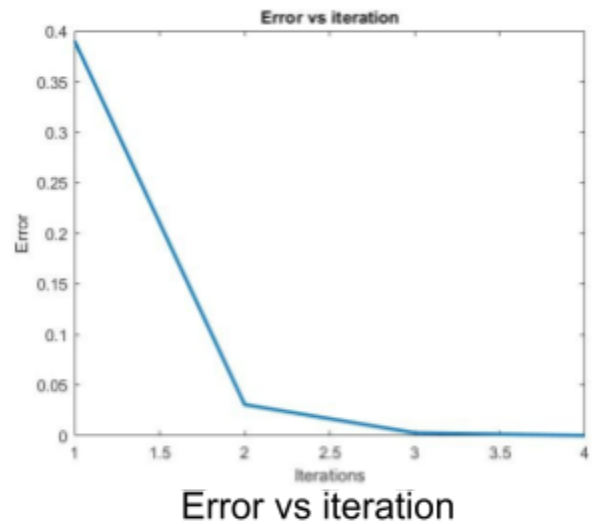
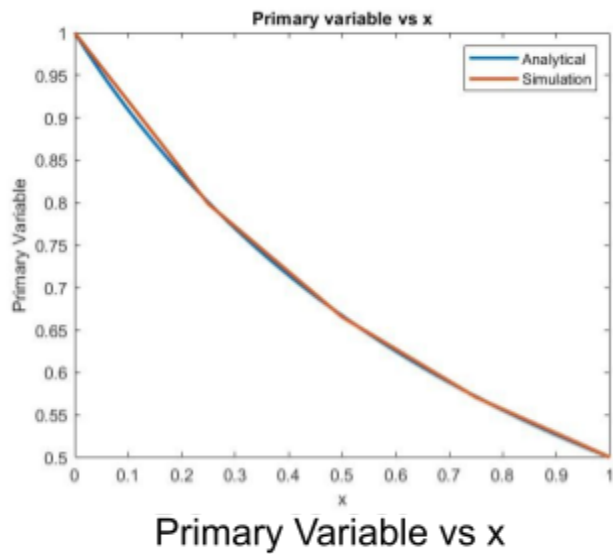


Error vs iteration

- 4 Element

Node No.	Global Coordinate of Node	Primary Variable
1	0	1
2	0.25	0.79821
3	0.5	0.66514
4	0.75	0.57063
5	1	0.5

Number of iterations - 4

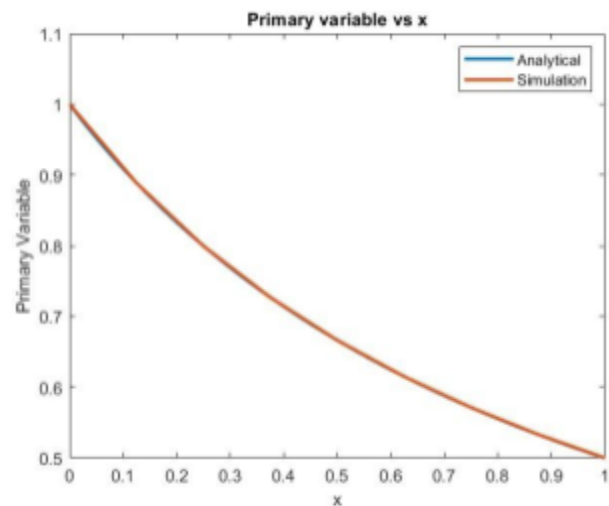


- 8 Element

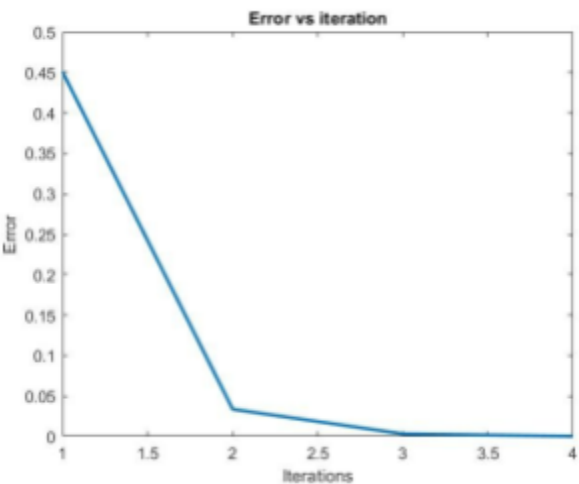
Node No.	Global Coordinate of Node	Primary Variable
1	0	1
2	0.125	0.88857
3	0.25	0.79958
4	0.375	0.72686

5	0.5	0.66631
6	0.625	0.61511
7	0.75	0.57124
8	0.875	0.53324
9	1	0.5

Number of Iteration = 4



Primary Variable vs x



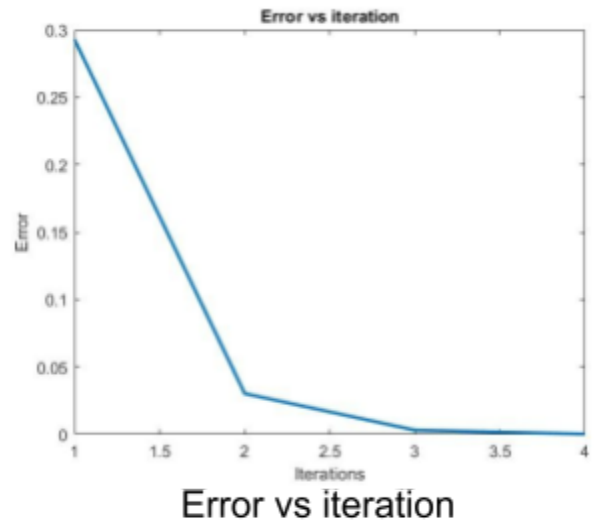
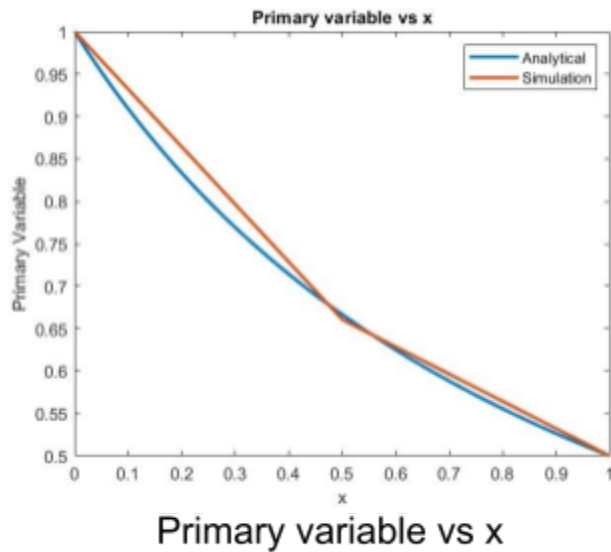
Error vs iteration

Quadratic Element

- 1 element

Node No.	Global Coordinate of Node	Primary Variable
1	0	1
2	0.5	0.66076
3	1	1

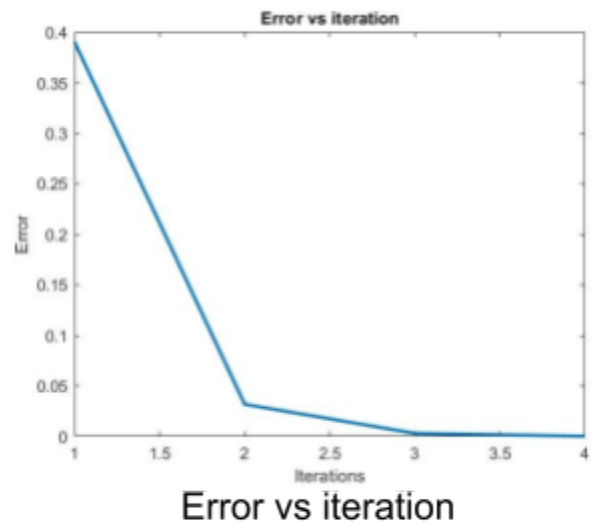
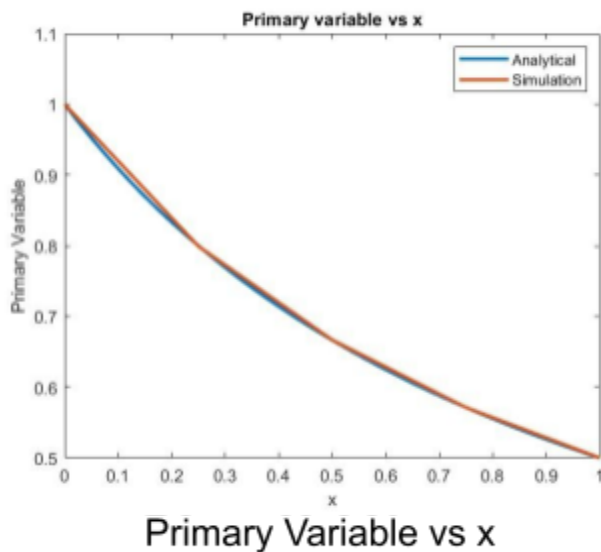
Number of Iterations = 4



- 2 element

Node No.	Global Coordinate of Node	Primary Variable
1	0	1
2	0.25	0.79924
3	0.5	0.66675
4	0.75	0.57132
5	1	0.5

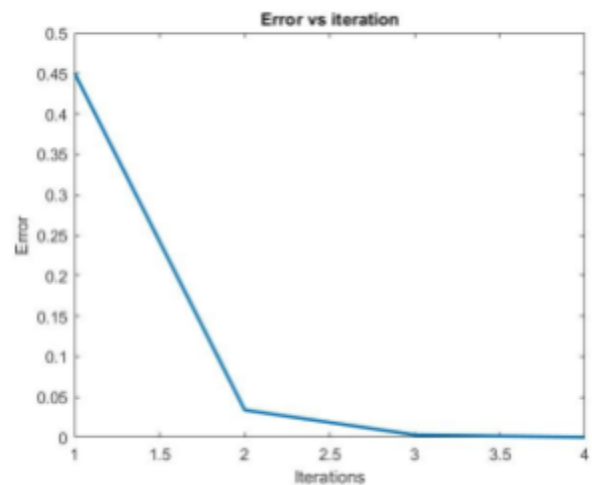
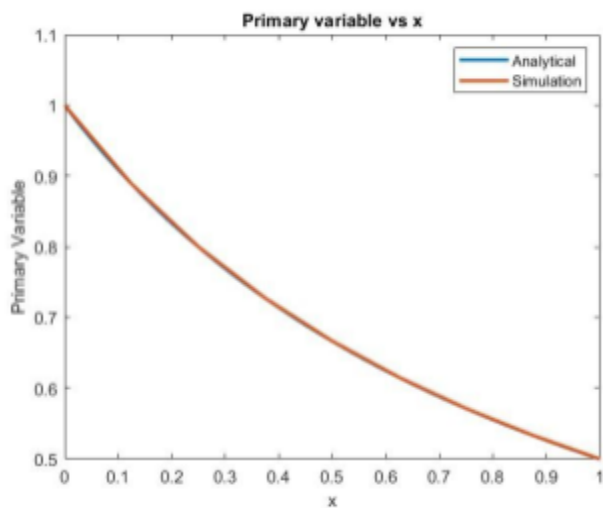
Number of Iterations = 4



- 4 element

Node No.	Global Coordinate of Node	Primary Variable
1	0	1
2	0.125	0.88883
3	0.25	0.80003
4	0.375	0.72728
5	0.5	0.6667
6	0.625	0.6154
7	0.75	0.57145
8	0.875	0.53334
9	1	0.5

Number of Iterations = 4



Primary Variable vs x

Error vs iteration

Newton's Iterations

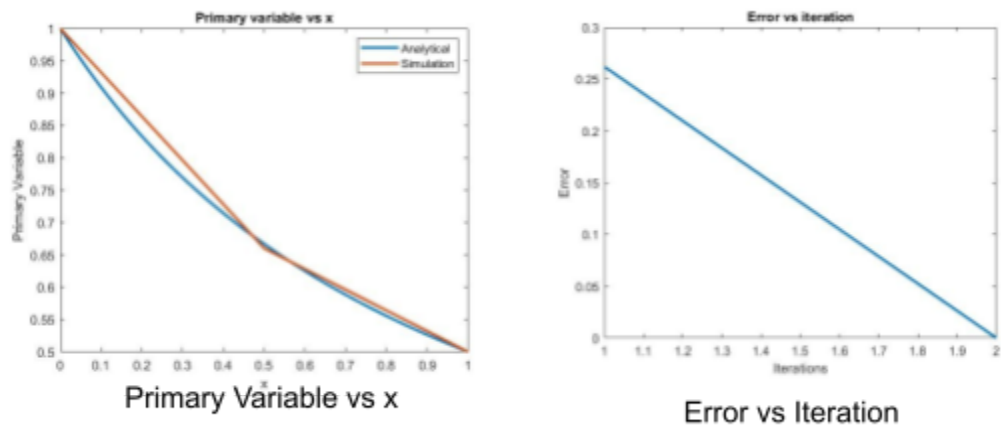
Linear Elements

- 2 Elements

Node No.	Global Coordinate of Node	Primary Variable
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1	0	1
2	0.5	0.66
3	1	0.5

Number of Iterations = 2

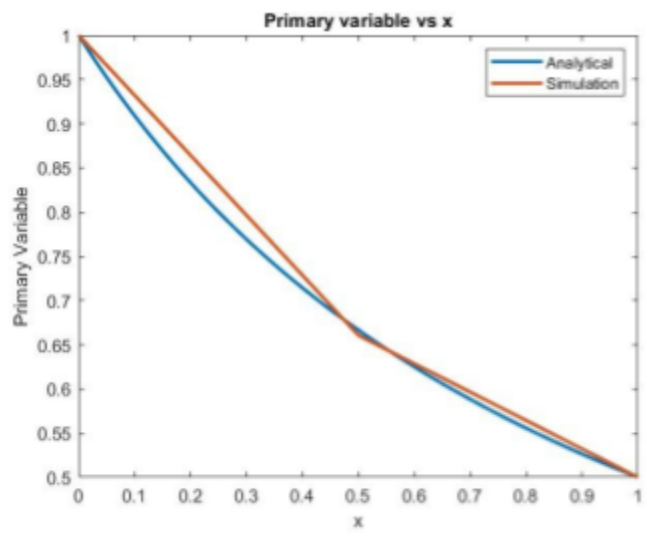


Quadratic Element

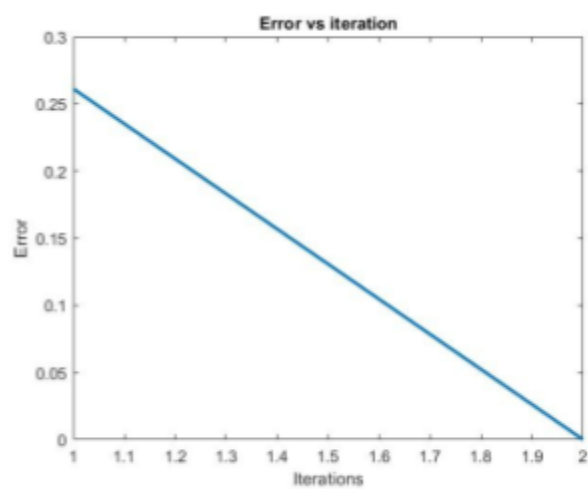
- 1 element

Node No.	Global Coordinate of Node	Primary Variable
1	0	1
2	0.5	0.66071
3	1	0.5

Number of Iterations = 2



Primary Variable vs x



Error vs iteration