

Problem 2

a) $P^p(\Omega)$

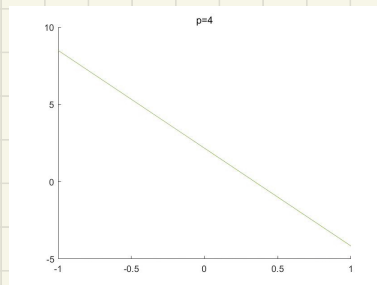
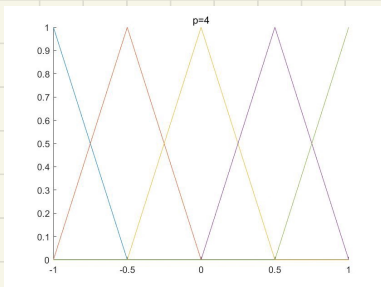
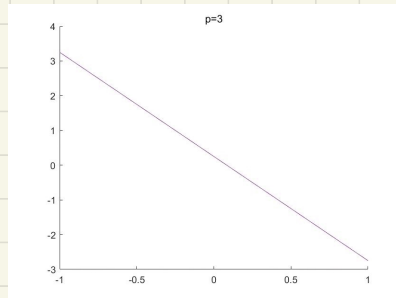
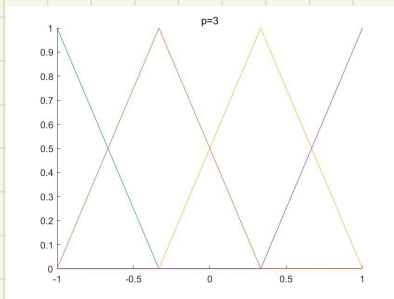
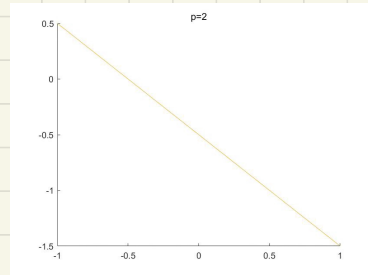
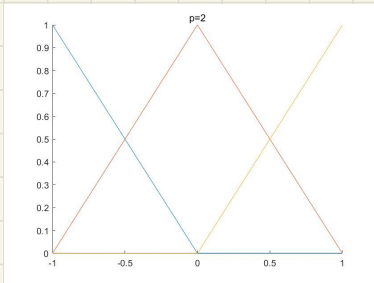
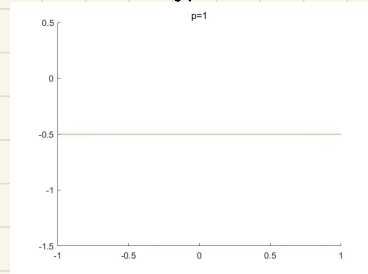
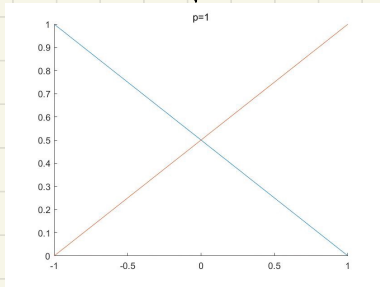
b) $\phi_i^e(x) = \prod_{\substack{j=1 \\ j \neq i}}^{p+1} \frac{x - \bar{x}_j}{\bar{x}_i - \bar{x}_j}$

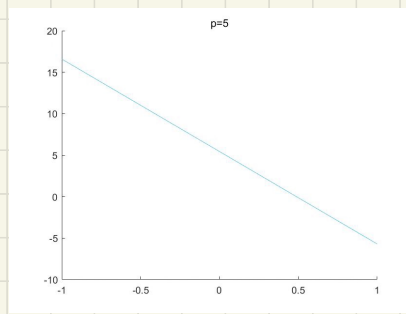
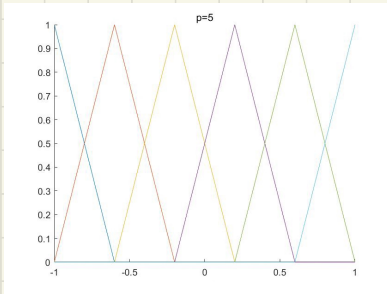
$$\frac{d\phi_i^e}{dx}(x) = \sum_{\substack{k=1 \\ k \neq i}}^{p+1} \left[\frac{1}{\bar{x}_i - \bar{x}_j} \prod_{\substack{j=1 \\ j \neq i \\ j \neq k}}^{p+1} \frac{x - \bar{x}_j}{\bar{x}_i - \bar{x}_j} \right]$$

c)

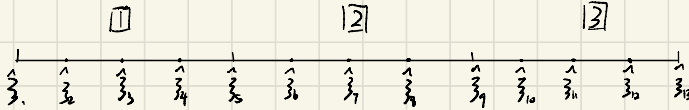
$\phi_i^e(x)$

$\frac{d\phi_i^e}{dx}(x)$





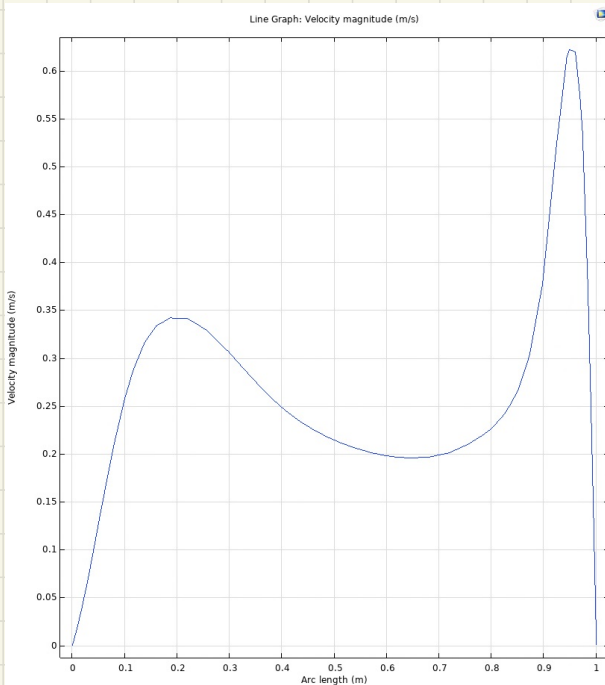
e)



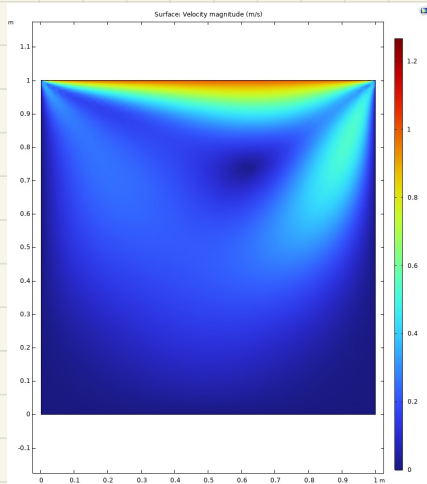
$$e2v_{xy} = \begin{bmatrix} 1 & 3 & 9 \\ 2 & 6 & 10 \\ 3 & 7 & 11 \\ 4 & 8 & 12 \\ 5 & 9 & 13 \end{bmatrix}$$

Problem 3

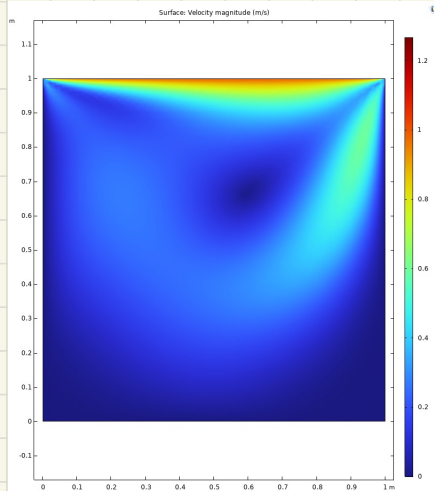
b)



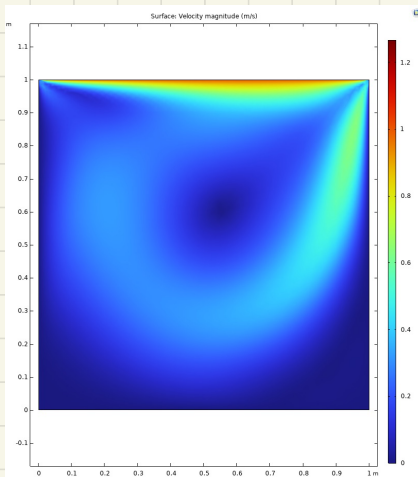
$$c) V = 0.001$$



$$V = 0.0005$$



$$V = 0.0025$$



$$V = 0.0001$$

