Homework 5 – Due 4/26/07 (50pts)

1. Given a triangular finite element with global node coordinates \((x_{ni},y_{ni})\): \(n_1(0,0), n_2(1,0), n_3(0,1)\), derive expressions, plot quiver plots in matlab, and discuss their properties for the following basis functions:

1.1 Whitney’s mixed-order TVFE of order 0.5 (also known as H0 complete):
\[
\xi_i \nabla \xi_j - \xi_j \nabla \xi_i, \ i < j
\]

1.2 Mixed-order TVFE of order 1.5 (H1 complete):
\[
\left(\xi_2 - \xi_3\right)\left(\xi_2 \nabla \xi_3 - \xi_3 \nabla \xi_2\right)
\]

Triangle:

8 VBF \((3 \times 2, 2)\).

\[
\xi_i = \frac{SA_{i}}{SA}
\]

\(SA_{i}\) - surface area \(P_{kl}\)

\(SA\) - surface area 123