20½

$$l = \langle \underline{n}, f_{11} \rangle = \frac{-4(\xi^1)^2 - 4(\xi^2)^2 + 2(\xi^1)^2 + 2(\xi^2)^2 - 2}{(1+(\xi^1)^2+(\xi^2)^2)} = -2$$

$$m = \langle \underline{n}, f_{12} \rangle = \frac{4\xi^1\xi^2 - 4\xi^1\xi^2 + 0}{1+(\xi^1)^2+(\xi^2)^2} = 0$$

$$n = \langle \underline{n}, f_{22} \rangle = \frac{4(\xi^1)^2 + 4(\xi^2)^2 + 2 - 2(\xi^1)^2 - 2(\xi^2)^2}{1+(\xi^1)^2+(\xi^2)^2}$$

$$= 2.$$

$$W = \frac{1}{(1+(\xi^1)^2+(\xi^2)^2)^4} \begin{bmatrix} (1+(\xi^1)^2+(\xi^2)^2)^2 & 0 \\ 0 & (1+(\xi^1)^2+(\xi^2)^2)^2 \end{bmatrix} \begin{bmatrix} -2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$= \frac{1}{(1+(\xi^1)^2+(\xi^2)^2)^2} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} -2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$= \frac{1}{(1+(\xi^1)^2+(\xi^2)^2)^2} \begin{bmatrix} -2 & 0 \\ 0 & 2 \end{bmatrix}$$

$Tr(W) = 0$

This method is much nicer than that presented in the course, much less complicated, much easier to mark.

True!

[Except that the l, m, n aren't easy to calculate. But it's a good method – glad you like it.]