

1

$$(a) \begin{bmatrix} 1/\sqrt{2} & -1/\sqrt{2} & -1 & -1/\sqrt{2} \\ 1/\sqrt{2} & 1/\sqrt{2} & 0 & -1/\sqrt{2} \end{bmatrix} \begin{bmatrix} t_I \\ t_{II} \\ t_{III} \\ t_{IV} \end{bmatrix} = \begin{bmatrix} 0 \\ -W \end{bmatrix}$$

$$(b) \begin{bmatrix} -W/\sqrt{2} \\ -W/\sqrt{2} \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} 1/\sqrt{2} & 1 \\ -1/\sqrt{2} & 0 \\ 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix}$$

$$(c) \begin{bmatrix} -0.4142 \\ -0.5858 \\ -0.1716 \\ 0.4142 \end{bmatrix} W$$

(d) -

2.

$$(a) \begin{bmatrix} (3x - x^2)/2 & (-x + x^2)/6 \end{bmatrix} \begin{bmatrix} d_2 \\ d_3 \end{bmatrix}$$

$$(b) EA \begin{bmatrix} 9/4 & -3/4 \\ -3/4 & 7/12 \end{bmatrix}$$

3.

(a) -

(b) -

$$(c) \int_0^L \frac{dv}{dx} Ak \frac{dH}{dx} dx = v(0)A\bar{V} + \int_0^L vQ dx$$

$$H(x=L) = \bar{H}$$

4.

$$(a) n_q = (1-\xi)(1-\eta)/4, n_r = (1+\xi)(1-\eta)/4, n_s = (1+\xi)(1+\eta)/4, n_t = (1-\xi)(1+\eta)/4$$

$$(b) \begin{bmatrix} x \\ y \end{bmatrix} = 1/4 \begin{bmatrix} 7 + 9\xi + \eta + 3\xi\eta \\ 6 + 6\eta \end{bmatrix}$$

(c) -

(d) -

$$(e) [0.116, 0.0125]$$