For all nodes $\Delta x = \Delta y = \Delta = 0.01$

NODE 1

For y $= 0$, $\hat{n} = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$

$$\nabla \mathrm{T} \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} 0 \\ -1 \end{bmatrix} = -\left.\frac{\partial T}{\partial y}\right|_{T1} = 0$$

For x $= 0$, $\hat{n} = \begin{bmatrix} -1 \\ 0 \end{bmatrix}$

$$\nabla \mathrm{T} \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} -1 \\ 0 \end{bmatrix} = -\left.\frac{\partial T}{\partial x}\right|_{T1} = 0$$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T1} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T1} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T2} - \left.\frac{\partial T}{\partial x}\right|_{T1}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T7} - \left.\frac{\partial T}{\partial y}\right|_{T1}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T2} + 0}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T7} + 0}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T2} + \left.\frac{\partial T}{\partial y}\right|_{T7}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T2} + \left.\frac{\partial T}{\partial y}\right|_{T7}$$

$$0 = \frac{T2 - T1}{\Delta x} + \frac{T7 - T1}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T2 - T1 + T7 - T1)$$

$$0 = T2 - 2T1 + T7$$

$$0 = 2T1 - T2 - T7$$

NODE 2

For y $= 0$, $\hat{n} = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$

$\nabla \mathrm{T} \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} 0 \\ -1 \end{bmatrix} = -\left.\frac{\partial T}{\partial y}\right|_{T2} = 0$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T2} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T2} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T3} - \left.\frac{\partial T}{\partial x}\right|_{T2}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T8} - \left.\frac{\partial T}{\partial y}\right|_{T2}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T3} - \left.\frac{\partial T}{\partial x}\right|_{T2}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T8} + 0}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T3} - \left.\frac{\partial T}{\partial x}\right|_{T2} + \left.\frac{\partial T}{\partial y}\right|_{T8}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T3} - \left.\frac{\partial T}{\partial x}\right|_{T2} + \left.\frac{\partial T}{\partial y}\right|_{T8}$$

$$0 = \frac{T3 - T2}{\Delta x} - \frac{T2 - T1}{\Delta x} + \frac{T8 - T2}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T3 - T2 - (T2 - T1) + T8 - T2)$$

$$0 = T3 - T2 - (T2 - T1) + T8 - T2$$

$$0 = T3 - T2 - T2 + T1 + T8 - T2$$

$$0 = T3 - 3T2 + T1 + T8$$

$$0 = -T1 + 3T2 - T3 - T8$$

NODE 3

For y $= 0$, $\hat{n} = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$

$\nabla \mathrm{T} \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} 0 \\ -1 \end{bmatrix} = -\left.\frac{\partial T}{\partial y}\right|_{T3} = 0$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T3} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T3} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T4} - \left.\frac{\partial T}{\partial x}\right|_{T3}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T9} - \left.\frac{\partial T}{\partial y}\right|_{T3}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T4} - \left.\frac{\partial T}{\partial x}\right|_{T3}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T9} + 0}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T4} - \left.\frac{\partial T}{\partial x}\right|_{T3} + \left.\frac{\partial T}{\partial y}\right|_{T9}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T4} - \left.\frac{\partial T}{\partial x}\right|_{T3} + \left.\frac{\partial T}{\partial y}\right|_{T9}$$

$$0 = \frac{T4 - T3}{\Delta x} - \frac{T3 - T2}{\Delta x} + \frac{T9 - T3}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T4 - T3 - (T3 - T2) + T9 - T3)$$

$$0 = T4 - T3 - (T3 - T2) + T9 - T3$$

$$0 = T4 - T3 - T3 + T2 + T9 - T3$$

$$0 = T4 - 3T3 + T2 + T9$$

$$0 = -T2 + 3T3 - T4 - T9$$

NODE 4

For y $= 0$, $\hat{n} = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$

$\nabla \mathrm{T} \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} 0 \\ -1 \end{bmatrix} = -\left.\frac{\partial T}{\partial y}\right|_{T4} = 0$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T4} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T4} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T5} - \left.\frac{\partial T}{\partial x}\right|_{T4}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T10} - \left.\frac{\partial T}{\partial y}\right|_{T4}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T5} - \left.\frac{\partial T}{\partial x}\right|_{T4}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T10} + 0}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T5} - \left.\frac{\partial T}{\partial x}\right|_{T4} + \left.\frac{\partial T}{\partial y}\right|_{T10}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T5} - \left.\frac{\partial T}{\partial x}\right|_{T4} + \left.\frac{\partial T}{\partial y}\right|_{T10}$$

$$0 = \frac{T5 - T4}{\Delta x} - \frac{T4 - T3}{\Delta x} + \frac{T10 - T4}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T5 - T4 - (T4 - T3) + T10 - T4)$$

$$0 = T5 - T4 - (T4 - T3) + T10 - T4$$

$$0 = T5 - T4 - T4 + T3 + T10 - T4$$

$$0 = T5 - 3T4 + T3 + T10$$

$$0 = -T3 + 3T4 - T5 - T10$$

NODE 5

For y $= 0$, $\hat{n} = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$

$\nabla \mathrm{T} \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} 0 \\ -1 \end{bmatrix} = -\left.\frac{\partial T}{\partial y}\right|_{T5} = 0$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T5} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T5} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T6} - \left.\frac{\partial T}{\partial x}\right|_{T5}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T11} - \left.\frac{\partial T}{\partial y}\right|_{T5}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T6} - \left.\frac{\partial T}{\partial x}\right|_{T5}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T11} + 0}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T6} - \left.\frac{\partial T}{\partial x}\right|_{T5} + \left.\frac{\partial T}{\partial y}\right|_{T11}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T6} - \left.\frac{\partial T}{\partial x}\right|_{T5} + \left.\frac{\partial T}{\partial y}\right|_{T11}$$

$$0 = \frac{T6 - T5}{\Delta x} - \frac{T5 - T4}{\Delta x} + \frac{T11 - T5}{\Delta y}$$

$$0 = \frac{1}{\Delta}(TT6 - T5 - (T5 - T4) + T11 - T5)$$

$$0 = T6 - T5 - (T5 - T4) + T11 - T5$$

$$0 = T6 - T5 - T5 + T4 + T11 - T5$$

$$0 = T6 - 3T5 + T4 + T11$$

$$0 = -T4 + 3T5 - T6 - T11$$

NODE 6

For y $= 0$, $\hat{n} = \begin{bmatrix} 0 \\ -1 \end{bmatrix}$

$\nabla \mathrm{T} \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} 0 \\ -1 \end{bmatrix} = -\left.\frac{\partial T}{\partial y}\right|_{T6} = 0$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T6} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T6} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{TCD} - \left.\frac{\partial T}{\partial x}\right|_{T6}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T12} - \left.\frac{\partial T}{\partial y}\right|_{T6}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{TCD} - \left.\frac{\partial T}{\partial x}\right|_{T6}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T12} - 0}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{TCD} - \left.\frac{\partial T}{\partial x}\right|_{T6} + \left.\frac{\partial T}{\partial y}\right|_{T12}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{TCD} - \left.\frac{\partial T}{\partial x}\right|_{T6} + \left.\frac{\partial T}{\partial y}\right|_{T12}$$

$$0 = \frac{TCD - T6}{\Delta x} - \frac{T6 - T5}{\Delta x} + \frac{T12 - T6}{\Delta y}$$

$$0 = \frac{1}{\Delta}(TCD - T6 - (T6 - T5) + T12 - T6)$$

$$0 = TCD - T6 - (T6 - T5) + T12 - T6$$

$$0 = TCD - T6 - T6 + T5 + T12 - T6$$

$$0 = 40 - 3T6 + T5 + T12$$

$$40 = -T5 + 3T6 - T12$$

NODE 7

For x $= 0$, $\hat{n} = \begin{bmatrix} -1 \\ 0 \end{bmatrix}$

$\nabla T \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} -1 \\ 0 \end{bmatrix} = -\left.\frac{\partial T}{\partial x}\right|_{T7} = 0$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T7} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T7} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T8} - \left.\frac{\partial T}{\partial x}\right|_{T7}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T13} - \left.\frac{\partial T}{\partial y}\right|_{T7}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T8} + 0}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T13} - \left.\frac{\partial T}{\partial y}\right|_{T7}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T8} + \left.\frac{\partial T}{\partial y}\right|_{T13} - \left.\frac{\partial T}{\partial y}\right|_{T7}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T8} + \left.\frac{\partial T}{\partial y}\right|_{T13} - \left.\frac{\partial T}{\partial y}\right|_{T7}$$

$$0 = \frac{T8 - T7}{\Delta x} + \frac{T13 - T7}{\Delta y} - \frac{T7 - T1}{\Delta y}$$

$$0 = \frac{1}{\Delta}(TT8 - T7 + T13 - T7 - (T7 - T1))$$

$$0 = T8 - T7 + T13 - T7 - (T7 - T1)$$

$$0 = T8 - T7 + T13 - T7 - T7 + T1$$

$$0 = T8 - 3T7 + T13 + T1$$

$$0 = -T1 + 3T7 - T8 - T13$$

NODE 8

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T8} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T8} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T9} - \left.\frac{\partial T}{\partial x}\right|_{T8}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T14} - \left.\frac{\partial T}{\partial y}\right|_{T8}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T9} - \left.\frac{\partial T}{\partial x}\right|_{T8} + \left.\frac{\partial T}{\partial y}\right|_{T14} - \left.\frac{\partial T}{\partial y}\right|_{T8}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T9} - \left.\frac{\partial T}{\partial x}\right|_{T8} + \left.\frac{\partial T}{\partial y}\right|_{T14} - \left.\frac{\partial T}{\partial y}\right|_{T8}$$

$$0 = \frac{T9 - T8}{\Delta x} - \frac{T8 - T7}{\Delta x} + \frac{T14 - T8}{\Delta y} - \frac{T8 - T2}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T9 - T8 - (T8 - T7) + T14 - T8 - (T8 - T2))$$

$$0 = T9 - T8 - (T8 - T7) + T14 - T8 - (T8 - T2)$$

$$0 = T9 - T8 - T8 + T7 + T14 - T8 - T8 + T2$$

$$0 = T9 - 4T8 + T7 + T14 + T2$$

$$0 = -T2 - T7 + 4T8 - T9 - T14$$

NODE 9

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T9} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T9} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T10} - \left.\frac{\partial T}{\partial x}\right|_{T9}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T15} - \left.\frac{\partial T}{\partial y}\right|_{T9}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T10} - \left.\frac{\partial T}{\partial x}\right|_{T9} + \left.\frac{\partial T}{\partial y}\right|_{T15} - \left.\frac{\partial T}{\partial y}\right|_{T9}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T10} - \left.\frac{\partial T}{\partial x}\right|_{T9} + \left.\frac{\partial T}{\partial y}\right|_{T15} - \left.\frac{\partial T}{\partial y}\right|_{T9}$$

$$0 = \frac{T10 - T9}{\Delta x} - \frac{T9 - T8}{\Delta x} + \frac{T15 - T9}{\Delta y} - \frac{T9 - T3}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T10 - T9 - (T9 - T8) + T15 - T9 - (T9 - T3))$$

$$0 = T10 - T9 - (T9 - T8) + T15 - T9 - (T9 - T3)$$

$$0 = T10 - T9 - T9 + T8 + T15 - T9 - T9 + T3$$

$$0 = T10 - 4T9 + T8 + T15 + T3$$

$$0 = -T3 - T8 + 4T9 - T10 - T15$$

NODE 10

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T10}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T10}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T11}-\left.\frac{\partial T}{\partial x}\right|_{T10}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{T16}-\left.\frac{\partial T}{\partial y}\right|_{T10}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T11}-\left.\frac{\partial T}{\partial x}\right|_{T10}+\left.\frac{\partial T}{\partial y}\right|_{T16}-\left.\frac{\partial T}{\partial y}\right|_{T10}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T11}-\left.\frac{\partial T}{\partial x}\right|_{T10}+\left.\frac{\partial T}{\partial y}\right|_{T16}-\left.\frac{\partial T}{\partial y}\right|_{T10}$$

$$0=\frac{T11-T10}{\Delta x}-\frac{T10\ -T9}{\Delta x}+\frac{T16-T10}{\Delta y}-\frac{T10-T4}{\Delta y}$$

$$0=\frac{1}{\Delta}(T11-T10-(T10\ -T9)+T16-T10-(T10-T4))$$

$$0=T11-T10-(T10\ -T9)+T16-T10-(T10-T4)$$

$$0=T11-T10-T10+T9+T16-T10-T10+T4$$

$$0=T11-4T10+T9+T16+T4$$

$$0=-T4-T9+4T10-T11-T16$$

NODE 11

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T11}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T11}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T12}-\left.\frac{\partial T}{\partial x}\right|_{T11}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{T17}-\left.\frac{\partial T}{\partial y}\right|_{T11}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T12}-\left.\frac{\partial T}{\partial x}\right|_{T11}+\left.\frac{\partial T}{\partial y}\right|_{T17}-\left.\frac{\partial T}{\partial y}\right|_{T11}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T12}-\left.\frac{\partial T}{\partial x}\right|_{T11}+\left.\frac{\partial T}{\partial y}\right|_{T17}-\left.\frac{\partial T}{\partial y}\right|_{T11}$$

$$0=\frac{T12-T11}{\Delta x}-\frac{T11\ -T10}{\Delta x}+\frac{T17-T11}{\Delta y}-\frac{T11-T5}{\Delta y}$$

$$0=\frac{1}{\Delta}(T12-T11-(T11\ -T10)+T17-T11-(T11-T5))$$

$$0=T12-T11-(T11\ -T10)+T17-T11-(T11-T5)$$

$$0=T12-T11-T11+T10+T17-T11-T11+T5$$

$$0=T12-4T11+T10+T17+T5$$

$$0=-T5-T10+4T11-T12-T17$$

NODE 12

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T12} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T12} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{TCD} - \left.\frac{\partial T}{\partial x}\right|_{T12}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T18} - \left.\frac{\partial T}{\partial y}\right|_{T12}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{TCD} - \left.\frac{\partial T}{\partial x}\right|_{T12} + \left.\frac{\partial T}{\partial y}\right|_{T18} - \left.\frac{\partial T}{\partial y}\right|_{T12}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{TCD} - \left.\frac{\partial T}{\partial x}\right|_{T12} + \left.\frac{\partial T}{\partial y}\right|_{T18} - \left.\frac{\partial T}{\partial y}\right|_{T12}$$

$$0 = \frac{TCD - T12}{\Delta x} - \frac{T12\ - T11}{\Delta x} + \frac{T18 - T12}{\Delta y} - \frac{T12 - T6}{\Delta y}$$

$$0 = \frac{1}{\Delta}(TCD - T12 - (T12\ - T11) + T18 - T12 - (T12 - T6))$$

$$0 = TCD - T12 - (T12\ - T11) + T18 - T12 - (T12 - T6)$$

$$0 = TCD - T12 - T12 + T11 + T18 - T12 - T12 + T6$$

$$0 = 40 - 4T12 + T11 + T18 + T6$$

$$40 = -T6 - T11 + 4T12 - T18$$

NODE 13

For x $= 0$, $\hat{n} = \begin{bmatrix} -1 \\ 0 \end{bmatrix}$

$$\nabla T \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} -1 \\ 0 \end{bmatrix} = -\left.\frac{\partial T}{\partial x}\right|_{T13} = 0$$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T13} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T13} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T14} - \left.\frac{\partial T}{\partial x}\right|_{T13}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T19} - \left.\frac{\partial T}{\partial y}\right|_{T13}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T14} + 0}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T19} - \left.\frac{\partial T}{\partial y}\right|_{T13}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T14} + \left.\frac{\partial T}{\partial y}\right|_{T19} - \left.\frac{\partial T}{\partial y}\right|_{T13}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T14} + \left.\frac{\partial T}{\partial y}\right|_{T19} - \left.\frac{\partial T}{\partial y}\right|_{T13}$$

$$0 = \frac{T14 - T13}{\Delta x} + \frac{T19 - T13}{\Delta y} - \frac{T13 - T7}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T14 - T13 + T19 - T13 - (T13 - T7))$$

$$0 = T14 - T13 + T19 - T13 - (T13 - T7)$$

$$0 = T14 - T13 + T19 - T13 - T13 + T7$$

$$0 = T14 - 3T13 + T19 + T7$$

$$0 = -T7 + 3T13 - T14 - T19$$

NODE 14

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T14}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T14}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T15}-\left.\frac{\partial T}{\partial x}\right|_{T14}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{T20}-\left.\frac{\partial T}{\partial y}\right|_{T14}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T15}-\left.\frac{\partial T}{\partial x}\right|_{T14}+\left.\frac{\partial T}{\partial y}\right|_{T20}-\left.\frac{\partial T}{\partial y}\right|_{T14}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T15}-\left.\frac{\partial T}{\partial x}\right|_{T14}+\left.\frac{\partial T}{\partial y}\right|_{T20}-\left.\frac{\partial T}{\partial y}\right|_{T14}$$

$$0=\frac{T15-T14}{\Delta x}-\frac{T14\ -T13}{\Delta x}+\frac{T20-T14}{\Delta y}-\frac{T14-T8}{\Delta y}$$

$$0=\frac{1}{\Delta}(T15-T14-(T14\ -T13)+T20-T14-(T14-T8))$$

$$0=T15-T14-(T14\ -T13)+T20-T14-(T14-T8)$$

$$0=T15-T14-T14+T13+T20-T14-T14+T8$$

$$0=T15-4T14+T13+T20+T8$$

$$0=-T8-T13+4T14-T15-T20$$

NODE 15

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T15}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T15}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T16}-\left.\frac{\partial T}{\partial x}\right|_{T15}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{T21}-\left.\frac{\partial T}{\partial y}\right|_{T15}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T16}-\left.\frac{\partial T}{\partial x}\right|_{T15}+\left.\frac{\partial T}{\partial y}\right|_{T21}-\left.\frac{\partial T}{\partial y}\right|_{T15}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T16}-\left.\frac{\partial T}{\partial x}\right|_{T15}+\left.\frac{\partial T}{\partial y}\right|_{T21}-\left.\frac{\partial T}{\partial y}\right|_{T15}$$

$$0=\frac{T16-T15}{\Delta x}-\frac{T15\ -T14}{\Delta x}+\frac{T21-T15}{\Delta y}-\frac{T15-T9}{\Delta y}$$

$$0=\frac{1}{\Delta}(T16-T15-(T15\ -T14)+T21-T15-(T15-T9))$$

$$0=T16-T15-(T15\ -T14)+T21-T15-(T15-T9)$$

$$0=T16-T15-T15+T14+T21-T15-T15+T9$$

$$0=T16-4T15+T14+T21+T9$$

$$0=-T9-T14+4T15-T16-T21$$

NODE 16

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T16}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T16}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T17}-\left.\frac{\partial T}{\partial x}\right|_{T16}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{T22}-\left.\frac{\partial T}{\partial y}\right|_{T16}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T17}-\left.\frac{\partial T}{\partial x}\right|_{T16}+\left.\frac{\partial T}{\partial y}\right|_{T22}-\left.\frac{\partial T}{\partial y}\right|_{T16}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T17}-\left.\frac{\partial T}{\partial x}\right|_{T16}+\left.\frac{\partial T}{\partial y}\right|_{T22}-\left.\frac{\partial T}{\partial y}\right|_{T16}$$

$$0=\frac{T17-T16}{\Delta x}-\frac{T16\ -T15}{\Delta x}+\frac{T22-T16}{\Delta y}-\frac{T16-T10}{\Delta y}$$

$$0=\frac{1}{\Delta}(T17-T16-(T16\ -T15)+T22-T16-(T16-T10))$$

$$0=T17-T16-(T16\ -T15)+T22-T16-(T16-T10)$$

$$0=T17-T16-T16+T15+T22-T16-T16+T10$$

$$0=T17-4T16+T15+T22+T10$$

$$0=-T10-T15+4T16-T17-T22$$

NODE 17

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T17}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T17}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T18}-\left.\frac{\partial T}{\partial x}\right|_{T17}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{T23}-\left.\frac{\partial T}{\partial y}\right|_{T17}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T18}-\left.\frac{\partial T}{\partial x}\right|_{T17}+\left.\frac{\partial T}{\partial y}\right|_{T23}-\left.\frac{\partial T}{\partial y}\right|_{T17}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T18}-\left.\frac{\partial T}{\partial x}\right|_{T17}+\left.\frac{\partial T}{\partial y}\right|_{T23}-\left.\frac{\partial T}{\partial y}\right|_{T17}$$

$$0=\frac{T18-T17}{\Delta x}-\frac{T17-T16}{\Delta x}+\frac{T23-T17}{\Delta y}-\frac{T17-T11}{\Delta y}$$

$$0=\frac{1}{\Delta}(T18-T17-(T17-T16)+T23-T17-(T17-T11))$$

$$0=T18-T17-(T17-T16)+T23-T17-(T17-T11)$$

$$0=T18-T17-T17+T16+T23-T17-T17+T11$$

$$0=T18-4T17+T16+T23+T11$$

$$0=-T11-T16+4T17-T18-T23$$

NODE 18

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T18} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T18} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{TCD} - \left.\frac{\partial T}{\partial x}\right|_{T18}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T24} - \left.\frac{\partial T}{\partial y}\right|_{T18}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{TCD} - \left.\frac{\partial T}{\partial x}\right|_{T18} + \left.\frac{\partial T}{\partial y}\right|_{T24} - \left.\frac{\partial T}{\partial y}\right|_{T18}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{TCD} - \left.\frac{\partial T}{\partial x}\right|_{T18} + \left.\frac{\partial T}{\partial y}\right|_{T24} - \left.\frac{\partial T}{\partial y}\right|_{T18}$$

$$0 = \frac{TCD - T18}{\Delta x} - \frac{T18 - T17}{\Delta x} + \frac{T24 - T18}{\Delta y} - \frac{T18 - T12}{\Delta y}$$

$$0 = \frac{1}{\Delta}(TCD - T18 - (T18 - T17) + T24 - T18 - (T18 - T12))$$

$$0 = TCD - T18 - (T18 - T17) + T24 - T18 - (T18 - T12)$$

$$0 = TCD - T18 - T18 + T17 + T24 - T18 - T18 + T12$$

$$0 = 40 - 4T18 + T17 + T24 + T12$$

$$40 = -T12 - T17 + 4T18 - T24$$

NODE 19

For x $= 0$, $\hat{n} = \begin{bmatrix} -1 \\ 0 \end{bmatrix}$

$$\nabla T \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} -1 \\ 0 \end{bmatrix} = -\left.\frac{\partial T}{\partial x}\right|_{T19} = 0$$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T19} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T19} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T20} - \left.\frac{\partial T}{\partial x}\right|_{T19}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T25} - \left.\frac{\partial T}{\partial y}\right|_{T19}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T20} + 0}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T25} - \left.\frac{\partial T}{\partial y}\right|_{T19}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T20} + \left.\frac{\partial T}{\partial y}\right|_{T25} - \left.\frac{\partial T}{\partial y}\right|_{T19}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T20} + \left.\frac{\partial T}{\partial y}\right|_{T25} - \left.\frac{\partial T}{\partial y}\right|_{T19}$$

$$0 = \frac{T20 - T19}{\Delta x} + \frac{T25 - T19}{\Delta y} - \frac{T19 - T13}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T20 - T19 + T25 - T19 - (T19 - T13))$$

$$0 = T20 - T19 + T25 - T19 - (T19 - T13)$$

$$0 = T20 - T19 + T25 - T19 - T19 + T13$$

$$0 = T20 - 3T19 + T25 + T13$$

$$0 = -T13 + 3T19 - T20 - T25$$

NODE 20

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T20} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T20} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T21} - \left.\frac{\partial T}{\partial x}\right|_{T20}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T26} - \left.\frac{\partial T}{\partial y}\right|_{T20}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T21} - \left.\frac{\partial T}{\partial x}\right|_{T20} + \left.\frac{\partial T}{\partial y}\right|_{T26} - \left.\frac{\partial T}{\partial y}\right|_{T20}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T21} - \left.\frac{\partial T}{\partial x}\right|_{T20} + \left.\frac{\partial T}{\partial y}\right|_{T26} - \left.\frac{\partial T}{\partial y}\right|_{T20}$$

$$0 = \frac{T21 - T20}{\Delta x} - \frac{T20 - T19}{\Delta x} + \frac{T26 - T20}{\Delta y} - \frac{T20 - T14}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T21 - T20 - (T20 - T19) + T26 - T20 - (T20 - T14))$$

$$0 = T21 - T20 - (T20 - T19) + T26 - T20 - (T20 - T14)$$

$$0 = T21 - T20 - T20 + T19 + T26 - T20 - T20 + T14$$

$$0 = T21 - 4T20 + T19 + T26 + T14$$

$$0 = -T14 - T19 + 4T20 - T21 - T26$$

NODE 21

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T21} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T21} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T22} - \left.\frac{\partial T}{\partial x}\right|_{T21}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T27} - \left.\frac{\partial T}{\partial y}\right|_{T21}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T22} - \left.\frac{\partial T}{\partial x}\right|_{T21} + \left.\frac{\partial T}{\partial y}\right|_{T27} - \left.\frac{\partial T}{\partial y}\right|_{T21}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T22} - \left.\frac{\partial T}{\partial x}\right|_{T21} + \left.\frac{\partial T}{\partial y}\right|_{T27} - \left.\frac{\partial T}{\partial y}\right|_{T21}$$

$$0 = \frac{T22 - T21}{\Delta x} - \frac{T21 - T20}{\Delta x} + \frac{T27 - T21}{\Delta y} - \frac{T21 - T15}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T22 - T21 - (T21 - T20) + T27 - T21 - (T21 - T15))$$

$$0 = T22 - T21 - (T21 - T20) + T27 - T21 - (T21 - T15)$$

$$0 = T22 - T21 - T21 + T20 + T27 - T21 - T21 + T15$$

$$0 = T22 - 4T21 + T20 + T27 + T15$$

$$0 = -T15 - T20 + 4T21 - T22 - T27$$

NODE 22

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T22}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T22}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T23}-\left.\frac{\partial T}{\partial x}\right|_{T22}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{T28}-\left.\frac{\partial T}{\partial y}\right|_{T22}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T23}-\left.\frac{\partial T}{\partial x}\right|_{T22}+\left.\frac{\partial T}{\partial y}\right|_{T28}-\left.\frac{\partial T}{\partial y}\right|_{T22}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T23}-\left.\frac{\partial T}{\partial x}\right|_{T22}+\left.\frac{\partial T}{\partial y}\right|_{T28}-\left.\frac{\partial T}{\partial y}\right|_{T22}$$

$$0=\frac{T23-T22}{\Delta x}-\frac{T22-T21}{\Delta x}+\frac{T28-T22}{\Delta y}-\frac{T22-T16}{\Delta y}$$

$$0=\frac{1}{\Delta}(T23-T22-(T22-T21)+T28-T22-(T22-T16))$$

$$0=c23-T22-(T22-T21)+T28-T22-(T22-T16)$$

$$0=T23-T22-T22+T21+T28-T22-T22+T16$$

$$0=T23-4T22+T21+T28+T16$$

$$0=-T16-T21+4T22-T23-T28$$

NODE 23

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T23}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T23}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T24}-\left.\frac{\partial T}{\partial x}\right|_{T23}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{T29}-\left.\frac{\partial T}{\partial y}\right|_{T23}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T24}-\left.\frac{\partial T}{\partial x}\right|_{T23}+\left.\frac{\partial T}{\partial y}\right|_{T29}-\left.\frac{\partial T}{\partial y}\right|_{T23}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T24}-\left.\frac{\partial T}{\partial x}\right|_{T23}+\left.\frac{\partial T}{\partial y}\right|_{T29}-\left.\frac{\partial T}{\partial y}\right|_{T23}$$

$$0=\frac{T24-T23}{\Delta x}-\frac{T23-T22}{\Delta x}+\frac{T29-T23}{\Delta y}-\frac{T23-T17}{\Delta y}$$

$$0=\frac{1}{\Delta}(T24-T23-(T23-T22)+T29-T23-(T23-T17))$$

$$0=T24-T23-(T23-T22)+T29-T23-(T23-T17)$$

$$0=T24-T23-T23+T22+T29-T23-T23+T17$$

$$0=T24-4T23+T22+T29+T17$$

$$0=-T17-T22+4T23-T24-T29$$

NODE 24
Let a denote the ambient temperature.

For y $= 0$, $\hat{n} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$

$3 \times \nabla \mathrm{T} \cdot \hat{n} = 20a - 20T_{24}$

$$\nabla T \cdot \hat{n} = \frac{20a - 20T_{24}}{3} = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} 0 \\ 1 \end{bmatrix} = \left.\frac{\partial T}{\partial y}\right|_{T24}$$

$$\left.\frac{\partial T}{\partial y}\right|_{T24} = \frac{20a - 20T_{24}}{3}$$

For diagonal component, $n = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

$$\|n\| = \sqrt{1^2 + 1^2}$$
$$= \sqrt{2}$$

$$\hat{n} = \frac{n}{\|n\|} = \frac{1}{\sqrt{2}} \times \begin{bmatrix} 1 \\ 1 \end{bmatrix} = \begin{bmatrix} \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{bmatrix}$$

$$\nabla T \cdot \hat{n} = \frac{20a - 20T_{24}}{3} = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{bmatrix} = \frac{1}{\sqrt{2}} \left(\left.\frac{\partial T}{\partial x}\right|_{T24} + \left.\frac{\partial T}{\partial y}\right|_{T24} \right)$$

$$\left.\frac{\partial T}{\partial x}\right|_{T24} + \left.\frac{\partial T}{\partial y}\right|_{T24} = \frac{\sqrt{2}(20a - 20T_{24})}{3}$$
$$\left.\frac{\partial T}{\partial x}\right|_{T24} = \frac{\sqrt{2}(20a - 20T_{24})}{3} - \left.\frac{\partial T}{\partial y}\right|_{T24}$$
$$\left.\frac{\partial T}{\partial x}\right|_{T24} = \frac{\sqrt{2}(20a - 20T_{24})}{3} - \frac{20a - 20T_{24}}{3}$$
$$\left.\frac{\partial T}{\partial x}\right|_{T24} = \frac{20a - 20T_{24}}{3}(\sqrt{2} - 1)$$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T24} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T24} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T24} - \left.\frac{\partial T}{\partial x}\right|_{T23}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T24} - \left.\frac{\partial T}{\partial y}\right|_{T18}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T24} - \left.\frac{\partial T}{\partial x}\right|_{T23} + \left.\frac{\partial T}{\partial y}\right|_{T24} - \left.\frac{\partial T}{\partial y}\right|_{T18} \right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T24} - \left.\frac{\partial T}{\partial x}\right|_{T23} + \left.\frac{\partial T}{\partial y}\right|_{T24} - \left.\frac{\partial T}{\partial y}\right|_{T18}$$

$$0 = \frac{20a - 20T_{24}}{3}(\sqrt{2} - 1) - \frac{(T24 - T23)}{\Delta x} + \frac{20a - 20T_{24}}{3} - \frac{(T24 - T18)}{\Delta y}$$

$$0 = \frac{\sqrt{2}(20a - 20T_{24})}{3} - \frac{20a - 20T_{24}}{3} - \frac{(T24 - T23)}{\Delta x} + \frac{20a - 20T_{24}}{3} - \frac{(T24 - T18)}{\Delta y}$$

$$0 = \frac{\sqrt{2}(20a - 20T_{24})}{3} - \frac{(T24 - T23)}{\Delta x} - \frac{(T24 - T18)}{\Delta y}$$

$$0 = \frac{20a\sqrt{2}}{3} - \frac{20T_{24}\sqrt{2}}{3} + \frac{-T24 + T23}{\Delta x} + \frac{-T24 + T18}{\Delta y}$$

$$0 = \frac{20a\sqrt{2}}{3} - \frac{20T_{24}\sqrt{2}}{3} + \frac{-T24 + T23 - T24 + T18}{0.01}$$

$$0 = \frac{20a\sqrt{2}}{300} - \frac{20T_{24}\sqrt{2}}{300} - T24 + T23 - T24 + T18$$

$$0 = \frac{a\sqrt{2}}{15} - \frac{T_{24}\sqrt{2}}{15} - T24 + T23 - T24 + T18$$

$$\frac{a\sqrt{2}}{15} = \left(\frac{30 + \sqrt{2}}{15}\right)T24 - T23 - T18$$

For $a = 20$

$$\frac{20\sqrt{2}}{15} = \left(\frac{30 + \sqrt{2}}{15}\right)T24 - T23 - T18$$

$$\frac{4\sqrt{2}}{3} = \left(\frac{30 + \sqrt{2}}{15}\right)T24 - T23 - T18$$

NODE 25

For x $= 0$, $\hat{n} = \begin{bmatrix} -1 \\ 0 \end{bmatrix}$

$$\nabla T \cdot \hat{n} = 0 = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} -1 \\ 0 \end{bmatrix} = -\left.\frac{\partial T}{\partial x}\right|_{T25} = 0$$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T25} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T25} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T26} - \left.\frac{\partial T}{\partial x}\right|_{T25}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T30} - \left.\frac{\partial T}{\partial y}\right|_{T25}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T26} + 0}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T30} - \left.\frac{\partial T}{\partial y}\right|_{T25}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T26} + \left.\frac{\partial T}{\partial y}\right|_{T30} - \left.\frac{\partial T}{\partial y}\right|_{T25}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T26} + \left.\frac{\partial T}{\partial y}\right|_{T30} - \left.\frac{\partial T}{\partial y}\right|_{T25}$$

$$0 = \frac{T26 - T25}{\Delta x} + \frac{T30 - T25}{\Delta y} - \frac{T25 - T19}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T26 - T25 + T30 - T25 - (T25 - T19))$$

$$0 = T26 - T25 + T30 - T25 - (T25 - T19)$$

$$0 = T26 - T25 + T30 - T25 - T25 + T19$$

$$0 = T26 - 3T25 + T30 + T19$$

$$0 = -T19 + 3T25 - T26 - T30$$

NODE 26

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T26} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T26} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T27} - \left.\frac{\partial T}{\partial x}\right|_{T26}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T31} - \left.\frac{\partial T}{\partial y}\right|_{T26}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T27} - \left.\frac{\partial T}{\partial x}\right|_{T26} + \left.\frac{\partial T}{\partial y}\right|_{T31} - \left.\frac{\partial T}{\partial y}\right|_{T26}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T27} - \left.\frac{\partial T}{\partial x}\right|_{T26} + \left.\frac{\partial T}{\partial y}\right|_{T31} - \left.\frac{\partial T}{\partial y}\right|_{T26}$$

$$0 = \frac{T27 - T26}{\Delta x} - \frac{T26 - T25}{\Delta x} + \frac{T31 - T26}{\Delta y} - \frac{T26 - T20}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T27 - T26 - (T26 - T25) + T31 - T26 - (T26 - T20))$$

$$0 = T27 - T26 - (T26 - T25) + T31 - T26 - (T26 - T20)$$

$$0 = T27 - T26 - T26 + T25 + T31 - T26 - T26 + T20$$

$$0 = T27 - 4T26 + T25 + T31 + T20$$

$$0 = -T20 - T25 + 4T26 - T27 - T31$$

NODE 27

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T27}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T27}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T28}-\left.\frac{\partial T}{\partial x}\right|_{T27}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{T32}-\left.\frac{\partial T}{\partial y}\right|_{T27}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T28}-\left.\frac{\partial T}{\partial x}\right|_{T27}+\left.\frac{\partial T}{\partial y}\right|_{T32}-\left.\frac{\partial T}{\partial y}\right|_{T27}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T28}-\left.\frac{\partial T}{\partial x}\right|_{T27}+\left.\frac{\partial T}{\partial y}\right|_{T32}-\left.\frac{\partial T}{\partial y}\right|_{T27}$$

$$0=\frac{T28-T27}{\Delta x}-\frac{T27-T26}{\Delta x}+\frac{T32-T27}{\Delta y}-\frac{T27-T21}{\Delta y}$$

$$0=\frac{1}{\Delta}(T28-T27-(T27-T26)+T32-T27-(T27-T21))$$

$$0=T28-T27-(T27-T26)+T32-T27-(T27-T21)$$

$$0=T28-T27-T27+T26+T32-T27-T27+T21$$

$$0=T28-4T27+T26+T32+T21$$

$$0=-T21-T26+4T27-T28-T32$$

NODE 28

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T28}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T28}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T29}-\left.\frac{\partial T}{\partial x}\right|_{T28}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{T33}-\left.\frac{\partial T}{\partial y}\right|_{T28}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T29}-\left.\frac{\partial T}{\partial x}\right|_{T28}+\left.\frac{\partial T}{\partial y}\right|_{T33}-\left.\frac{\partial T}{\partial y}\right|_{T28}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T29}-\left.\frac{\partial T}{\partial x}\right|_{T28}+\left.\frac{\partial T}{\partial y}\right|_{T33}-\left.\frac{\partial T}{\partial y}\right|_{T28}$$

$$0=\frac{T29-T28}{\Delta x}-\frac{T28-T27}{\Delta x}+\frac{T33-T28}{\Delta y}-\frac{T28-T22}{\Delta y}$$

$$0=\frac{1}{\Delta}(T29-T28-(T28-T27)+T33-T28-(T28-T22))$$

$$0=T29-T28-(T28-T27)+T33-T28-(T28-T22)$$

$$0=T29-T28-T28+T27+T33-T28-T28+T22$$

$$0=T29-4T28+T27+T33+T22$$

$$0=-T22-T27+4T28-T29-T33$$

NODE 29

Let a denote the ambient temperature.

For diagonal component, $n = \begin{bmatrix}1\\1\end{bmatrix}$

$$\|n\| = \sqrt{1^2 + 1^2}$$
$$= \sqrt{2}$$

$$\hat{n} = \frac{n}{\|n\|} = \frac{1}{\sqrt{2}} \times \begin{bmatrix}1\\1\end{bmatrix} = \begin{bmatrix}\frac{1}{\sqrt{2}}\\ \frac{1}{\sqrt{2}}\end{bmatrix}$$

$$\nabla T \cdot \hat{n} = \frac{20a - 20T_{29}}{3} = \begin{bmatrix}T_x\\T_y\end{bmatrix} \cdot \begin{bmatrix}\frac{1}{\sqrt{2}}\\ \frac{1}{\sqrt{2}}\end{bmatrix} = \frac{1}{\sqrt{2}}\left(\frac{\partial T}{\partial x}\Big|_{T29} + \frac{\partial T}{\partial y}\Big|_{T29}\right)$$

$$\frac{\partial T}{\partial x}\Big|_{T29} + \frac{\partial T}{\partial y}\Big|_{T29} = \frac{\sqrt{2}(20a - 20T_{29})}{3}$$

$$\frac{\partial^2 T}{\partial \mathrm{x}^2}\Big|_{T29} + \frac{\partial^2 T}{\partial \mathrm{y}^2}\Big|_{T29} = 0 = \frac{\frac{\partial T}{\partial x}\Big|_{T29} - \frac{\partial T}{\partial x}\Big|_{T28}}{\Delta x} + \frac{\frac{\partial T}{\partial y}\Big|_{T29} - \frac{\partial T}{\partial y}\Big|_{T23}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\frac{\partial T}{\partial x}\Big|_{T29} - \frac{\partial T}{\partial x}\Big|_{T28} + \frac{\partial T}{\partial y}\Big|_{T29} - \frac{\partial T}{\partial y}\Big|_{T23}\right)$$

$$0 = \frac{\partial T}{\partial x}\Big|_{T29} + \frac{\partial T}{\partial y}\Big|_{T29} - \frac{\partial T}{\partial x}\Big|_{T28} - \frac{\partial T}{\partial y}\Big|_{T23}$$

$$0 = \frac{\sqrt{2}(20a - 20T_{29})}{3} - \frac{(T29 - T28)}{\Delta x} - \frac{(T29 - T23)}{\Delta y}$$

$$0 = \frac{20a\sqrt{2}}{3} - \frac{20T_{29}\sqrt{2}}{3} + \frac{-T29 + T28}{\Delta x} + \frac{-T29 + T23}{\Delta y}$$

$$0 = \frac{20a\sqrt{2}}{3} - \frac{20T_{29}\sqrt{2}}{3} + \frac{-T29 + T28 - T29 + T23}{0.01}$$

$$0 = \frac{20a\sqrt{2}}{300} - \frac{20T_{29}\sqrt{2}}{300} - T29 + T28 - T29 + T23$$

$$0 = \frac{a\sqrt{2}}{15} - \frac{T_{29}\sqrt{2}}{15} - T29 + T28 - T29 + T23$$

$$\frac{a\sqrt{2}}{15} = \left(\frac{30 + \sqrt{2}}{15}\right)T29 - T28 - T23$$

For $a = 20$

$$\frac{20\sqrt{2}}{15} = \left(\frac{30+\sqrt{2}}{15}\right)T29 - T28 - T23$$
$$\frac{4\sqrt{2}}{3} = \left(\frac{30+\sqrt{2}}{15}\right)T29 - T28 - T23$$

NODE 30

For x $= 0$, $\hat{n} = \begin{bmatrix}-1\\0\end{bmatrix}$

$$\nabla T \cdot \hat{n} = 0 = \begin{bmatrix}T_x\\T_y\end{bmatrix} \cdot \begin{bmatrix}-1\\0\end{bmatrix} = -\left.\frac{\partial T}{\partial x}\right|_{T30} = 0$$

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T30} + \left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T30} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T31} - \left.\frac{\partial T}{\partial x}\right|_{T30}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{TAB} - \left.\frac{\partial T}{\partial y}\right|_{T30}}{\Delta y}$$

$$0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T31} + 0}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{TAB} - \left.\frac{\partial T}{\partial y}\right|_{T30}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T31} + \left.\frac{\partial T}{\partial y}\right|_{TAB} - \left.\frac{\partial T}{\partial y}\right|_{T30}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T31} + \left.\frac{\partial T}{\partial y}\right|_{TAB} - \left.\frac{\partial T}{\partial y}\right|_{T30}$$

$$0 = \frac{T31 - T30}{\Delta x} + \frac{TAB - T30}{\Delta y} - \frac{T30 - T25}{\Delta y}$$

$$0 = \frac{1}{\Delta}(T31 - T30 + TAB - T30 - (T30 - T25))$$

$$0 = T31 - T30 + TAB - T30 - (T30 - T25)$$

$$0 = T31 - T30 + TAB - T30 - T30 + T25$$

$$0 = T31 - 3T30 + 70 + T25$$

$$70 = -T25 + 3T30 - T31$$

NODE 31

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T31}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T31}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T32}-\left.\frac{\partial T}{\partial x}\right|_{T31}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{TAB}-\left.\frac{\partial T}{\partial y}\right|_{T31}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T32}-\left.\frac{\partial T}{\partial x}\right|_{T31}+\left.\frac{\partial T}{\partial y}\right|_{TAB}-\left.\frac{\partial T}{\partial y}\right|_{T31}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T32}-\left.\frac{\partial T}{\partial x}\right|_{T31}+\left.\frac{\partial T}{\partial y}\right|_{TAB}-\left.\frac{\partial T}{\partial y}\right|_{T31}$$

$$0=\frac{T32-T31}{\Delta x}-\frac{T31-T30}{\Delta x}+\frac{TAB-T31}{\Delta y}-\frac{T31-T26}{\Delta y}$$

$$0=\frac{1}{\Delta}(T32-T31-(T31-T30)+TAB-T31-(T31-T26))$$

$$0=T32-T31-(T31-T30)+TAB-T31-(T31-T26)$$

$$0=T32-T31-T31+T30+TAB-T31-T31+T26$$

$$0=T32-4T31+T30+TAB+T26$$

$$70=-T26-T30+4T31-T32$$

NODE 32

$$\left.\frac{\partial^2 T}{\partial \mathrm{x}^2}\right|_{T32}+\left.\frac{\partial^2 T}{\partial \mathrm{y}^2}\right|_{T32}=0=\frac{\left.\frac{\partial T}{\partial x}\right|_{T33}-\left.\frac{\partial T}{\partial x}\right|_{T32}}{\Delta x}+\frac{\left.\frac{\partial T}{\partial y}\right|_{TAB}-\left.\frac{\partial T}{\partial y}\right|_{T32}}{\Delta y}$$

$$0=\frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T33}-\left.\frac{\partial T}{\partial x}\right|_{T32}+\left.\frac{\partial T}{\partial y}\right|_{TAB}-\left.\frac{\partial T}{\partial y}\right|_{T32}\right)$$

$$0=\left.\frac{\partial T}{\partial x}\right|_{T33}-\left.\frac{\partial T}{\partial x}\right|_{T32}+\left.\frac{\partial T}{\partial y}\right|_{TAB}-\left.\frac{\partial T}{\partial y}\right|_{T32}$$

$$0=\frac{T33-T32}{\Delta x}-\frac{T32-T31}{\Delta x}+\frac{TAB-T32}{\Delta y}-\frac{T32-T27}{\Delta y}$$

$$0=\frac{1}{\Delta}(T33-T32-(T32-T31)+TAB-T32-(T32-T27))$$

$$0=T33-T32-(T32-T31)+TAB-T32-(T32-T27)$$

$$0=T33-T32-T32+T31+TAB-T32-T32+T27$$

$$0=T33-4T32+T31+TAB+T27$$

$$70=-T27-T31+4T32-T33$$

NODE 33
Let a denote the ambient temperature.

For $x = 0$, $\hat{n} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$

$3 \times \nabla T \cdot \hat{n} = 20a - 20T_{33}$

$\nabla T \cdot \hat{n} = \dfrac{20a - 20T_{33}}{3} = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} 1 \\ 0 \end{bmatrix} = \left.\dfrac{\partial T}{\partial x}\right|_{T33}$

$$\left.\frac{\partial T}{\partial x}\right|_{T33} = \frac{20a - 20T_{33}}{3}$$

For diagonal component, $n = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

$$\|n\| = \sqrt{1^2 + 1^2}$$
$$= \sqrt{2}$$

$$\hat{n} = \frac{n}{\|n\|} = \frac{1}{\sqrt{2}} \times \begin{bmatrix} 1 \\ 1 \end{bmatrix} = \begin{bmatrix} \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{bmatrix}$$

$$\nabla T \cdot \hat{n} = \frac{20a - 20T_{33}}{3} = \begin{bmatrix} T_x \\ T_y \end{bmatrix} \cdot \begin{bmatrix} \frac{1}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{bmatrix} = \frac{1}{\sqrt{2}}\left(\left.\frac{\partial T}{\partial x}\right|_{T33} + \left.\frac{\partial T}{\partial y}\right|_{T33}\right)$$

$$\left.\frac{\partial T}{\partial x}\right|_{T33} + \left.\frac{\partial T}{\partial y}\right|_{T33} = \frac{\sqrt{2}(20a - 20T_{33})}{3}$$
$$\left.\frac{\partial T}{\partial y}\right|_{T33} = \frac{\sqrt{2}(20a - 20T_{33})}{3} - \left.\frac{\partial T}{\partial x}\right|_{T33}$$
$$\left.\frac{\partial T}{\partial y}\right|_{T33} = \frac{\sqrt{2}(20a - 20T_{33})}{3} - \frac{20a - 20T_{33}}{3}$$
$$\left.\frac{\partial T}{\partial y}\right|_{T33} = \frac{20a - 20T_{33}}{3}(\sqrt{2} - 1)$$

$$\left.\frac{\partial^2 T}{\partial x^2}\right|_{T33} + \left.\frac{\partial^2 T}{\partial y^2}\right|_{T33} = 0 = \frac{\left.\frac{\partial T}{\partial x}\right|_{T33} - \left.\frac{\partial T}{\partial x}\right|_{T32}}{\Delta x} + \frac{\left.\frac{\partial T}{\partial y}\right|_{T33} - \left.\frac{\partial T}{\partial y}\right|_{T28}}{\Delta y}$$

$$0 = \frac{1}{\Delta}\left(\left.\frac{\partial T}{\partial x}\right|_{T33} - \left.\frac{\partial T}{\partial x}\right|_{T32} + \left.\frac{\partial T}{\partial y}\right|_{T33} - \left.\frac{\partial T}{\partial y}\right|_{T28}\right)$$

$$0 = \left.\frac{\partial T}{\partial x}\right|_{T33} - \left.\frac{\partial T}{\partial x}\right|_{T32} + \left.\frac{\partial T}{\partial y}\right|_{T33} - \left.\frac{\partial T}{\partial y}\right|_{T28}$$

$$0 = \frac{20a - 20T_{33}}{3} - \frac{(T33 - T32)}{\Delta x} + \frac{20a - 20T_{33}}{3}(\sqrt{2} - 1) - \frac{(T33 - T28)}{\Delta y}$$

$$0 = \frac{20a - 20T_{33}}{3} + \frac{\sqrt{2}(20a - 20T_{33})}{3} - \frac{20a - 20T_{33}}{3} - \frac{(T33 - T32)}{\Delta x} - \frac{(T33 - T28)}{\Delta y}$$

$$0 = \frac{\sqrt{2}(20a - 20T_{33})}{3} - \frac{(T33 - T32)}{\Delta x} - \frac{(T33 - T28)}{\Delta y}$$

$$0 = \frac{20a\sqrt{2}}{3} - \frac{20T_{33}\sqrt{2}}{3} + \frac{-T33 + T32}{\Delta x} + \frac{-T33 + T28}{\Delta y}$$

$$0 = \frac{20a\sqrt{2}}{3} - \frac{20T_{33}\sqrt{2}}{3} + \frac{-T33 + T32 - T33 + T28}{0.01}$$

$$0 = \frac{20a\sqrt{2}}{300} - \frac{20T_{33}\sqrt{2}}{300} - T33 + T32 - T33 + T28$$

$$0 = \frac{a\sqrt{2}}{15} - \frac{T_{33}\sqrt{2}}{15} - T33 + T32 - T33 + T28$$

$$\frac{a\sqrt{2}}{15} = \left(\frac{30 + \sqrt{2}}{15}\right)T33 - T32 - T28$$

For $a = 20$

$$\frac{20\sqrt{2}}{15} = \left(\frac{30 + \sqrt{2}}{15}\right)T33 - T32 - T28$$

$$\frac{4\sqrt{2}}{3} = \left(\frac{30 + \sqrt{2}}{15}\right)T33 - T32 - T28$$

Summary of each node

NODE 1

$0 = 2T1 - T2 - T7$

NODE 2

$0 = -T1 + 3T2 - T3 - T8$

NODE 3

$0 = -T2 + 3T3 - T4 - T9$

NODE 4

$0 = -T3 + 3T4 - T5 - T10$

NODE 5

$0 = -T4 + 3T5 - T6 - T11$

NODE 6

$40 = -T5 + 3T6 - T12$

NODE 7
$0 = -T1 + 3T7 - T8 - T13$

NODE 8
$0 = -T2 - T7 + 4T8 - T9 - T14$

NODE 9
$0 = -T3 - T8 + 4T9 - T10 - T15$

NODE 10
$0 = -T4 - T9 + 4T10 - T11 - T16$

NODE 11
$0 = -T5 - T10 + 4T11 - T12 - T17$

NODE 12
$40 = -T6 - T11 + 4T12 - T18$

NODE 13
$0 = -T7 + 3T13 - T14 - T19$

NODE 14
$0 = -T8 - T13 + 4T14 - T15 - T20$

NODE 15
$0 = -T9 - T14 + 4T15 - T16 - T21$

NODE 16
$0 = -T10 - T15 + 4T16 - T17 - T22$

NODE 17
$0 = -T11 - T16 + 4T17 - T18 - T23$

NODE 18
$40 = -T12 - T17 + 4T18 - T24$

NODE 19
$0 = -T13 + 3T19 - T20 - T25$

NODE 20
$0 = -T14 - T19 + 4T20 - T21 - T26$

NODE 21
$0 = -T15 - T20 + 4T21 - T22 - T27$

NODE 22
$0 = -T16 - T21 + 4T22 - T23 - T28$

NODE 23

$$0 = -T17 - T22 + 4T23 - T24 - T29$$

NODE 24

$$\frac{4\sqrt{2}}{3} = -T18 - T23 + \left(\frac{30+\sqrt{2}}{15}\right)T24$$

NODE 25

$$0 = -T19 + 3T25 - T26 - T30$$

NODE 26

$$0 = -T20 - T25 + 4T26 - T27 - T31$$

NODE 27

$$0 = -T21 - T26 + 4T27 - T28 - T32$$

NODE 28

$$0 = -T22 - T27 + 4T28 - T29 - T33$$

NODE 29

$$\frac{4\sqrt{2}}{3} = -T23 - T28 + \left(\frac{30+\sqrt{2}}{15}\right)T29$$

NODE 30

$$70 = -T25 + 3T30 - T31$$

NODE 31

$$70 = -T26 - T30 + 4T31 - T32$$

NODE 32

$$70 = -T27 - T31 + 4T32 - T33$$

NODE 33

$$\frac{4\sqrt{2}}{3} = -T28 - T32 + \left(\frac{30+\sqrt{2}}{15}\right)T33$$