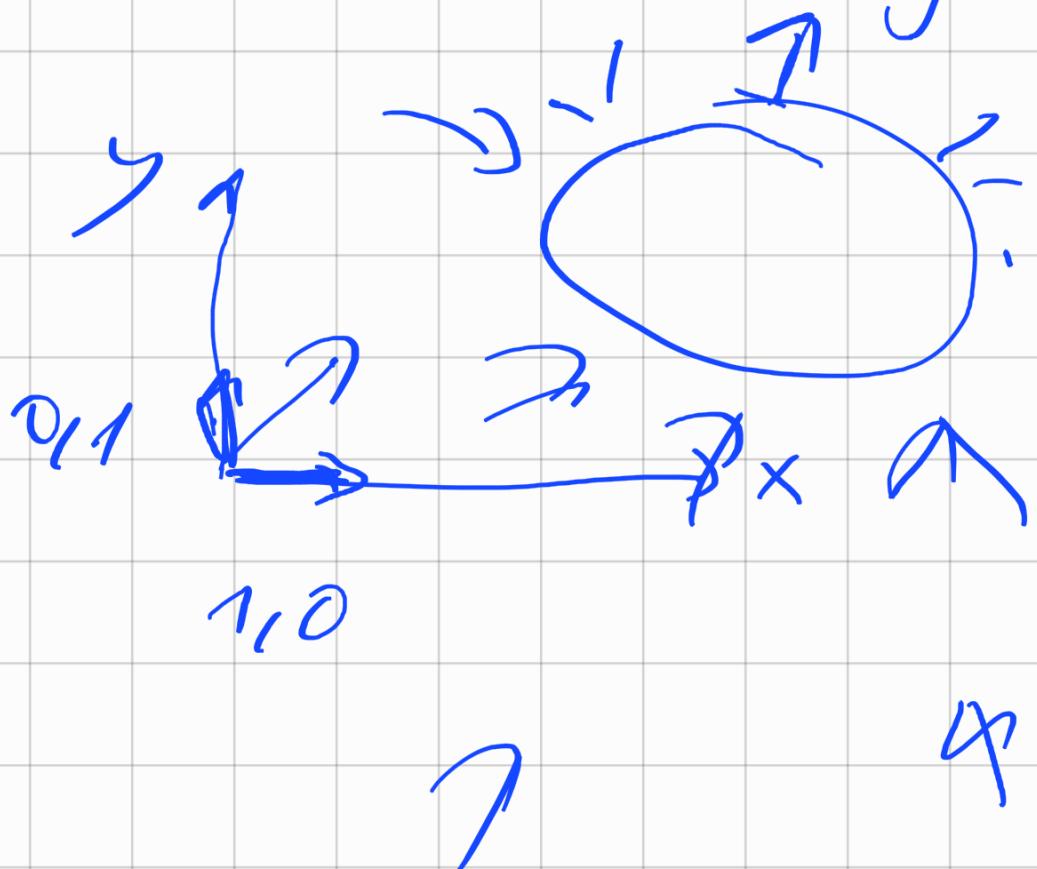
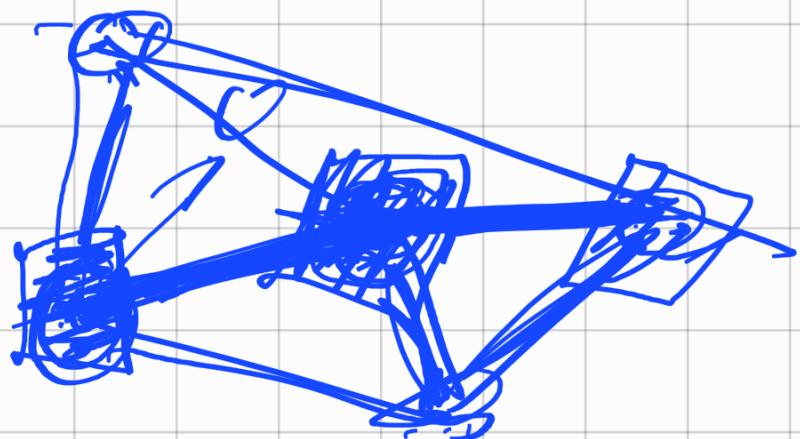


$$\nabla f(x, y) = \frac{\partial f(x, y)}{\partial x} e_1 + \frac{\partial f(x, y)}{\partial y} e_2$$

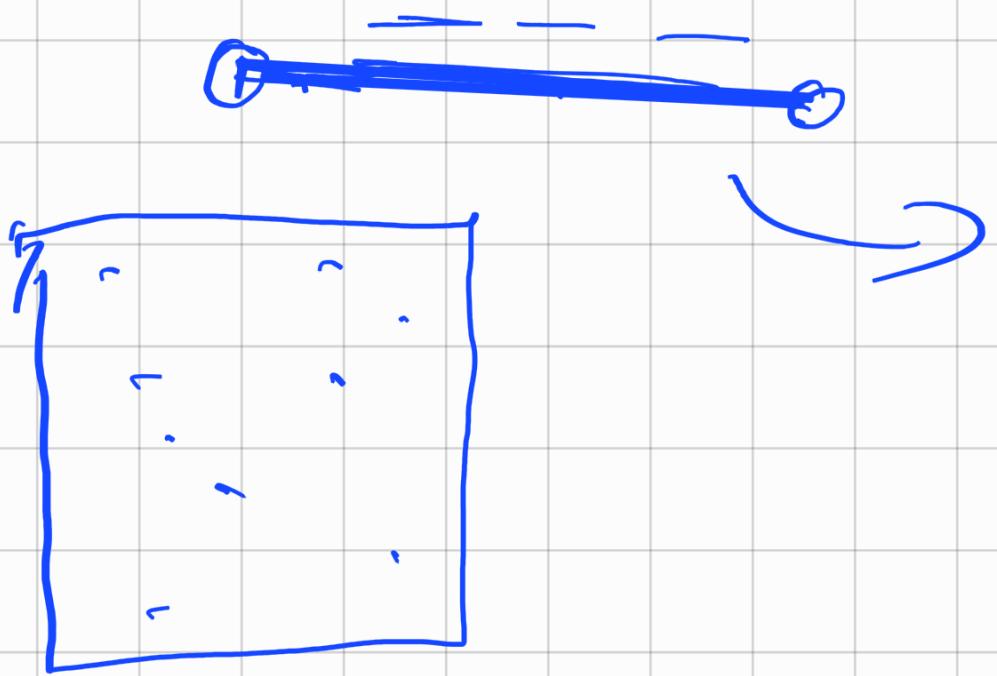


$$\nabla^2 f = 0 \quad T(x, y)$$



$$\nabla^2 T(x, y) = 0$$

$$\nabla^2 = \Delta$$



$$\Delta T = 0$$

$$AT(x, y) = \frac{\partial^2 T(x, y)}{\partial x^2} + \frac{\partial^2 T(x, y)}{\partial y^2} = 0$$

$$\frac{\partial^2 T(x_i, y_j)}{\partial x^2} =$$

$$\frac{T(x_{i+1}, y_j) - 2T(x_i, y_j) + T(x_{i-1}, y_j)}{\Delta x^2}$$

$$\frac{\partial^2 T(x_i, y_j)}{\partial y^2} =$$

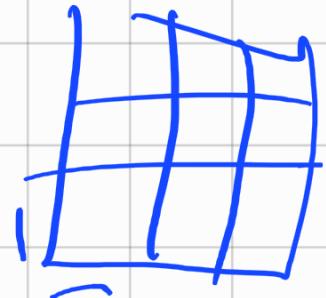
$$\frac{T(x_i, y_{j+1}) - 2T(x_i, y_j) + T(x_i, y_{j-1})}{\Delta y^2}$$

$$T(x_i, y_j) \rightarrow T(i, j)$$

$$\frac{T(i+1, j) - 2T(i, j) + T(i-1, j)}{\Delta x^2} + t$$

$$\frac{T(i, j+1) - 2T(i, j) + T(i, j-1)}{\Delta y^2} = 0$$

$$\underline{\Delta x = \Delta y}$$



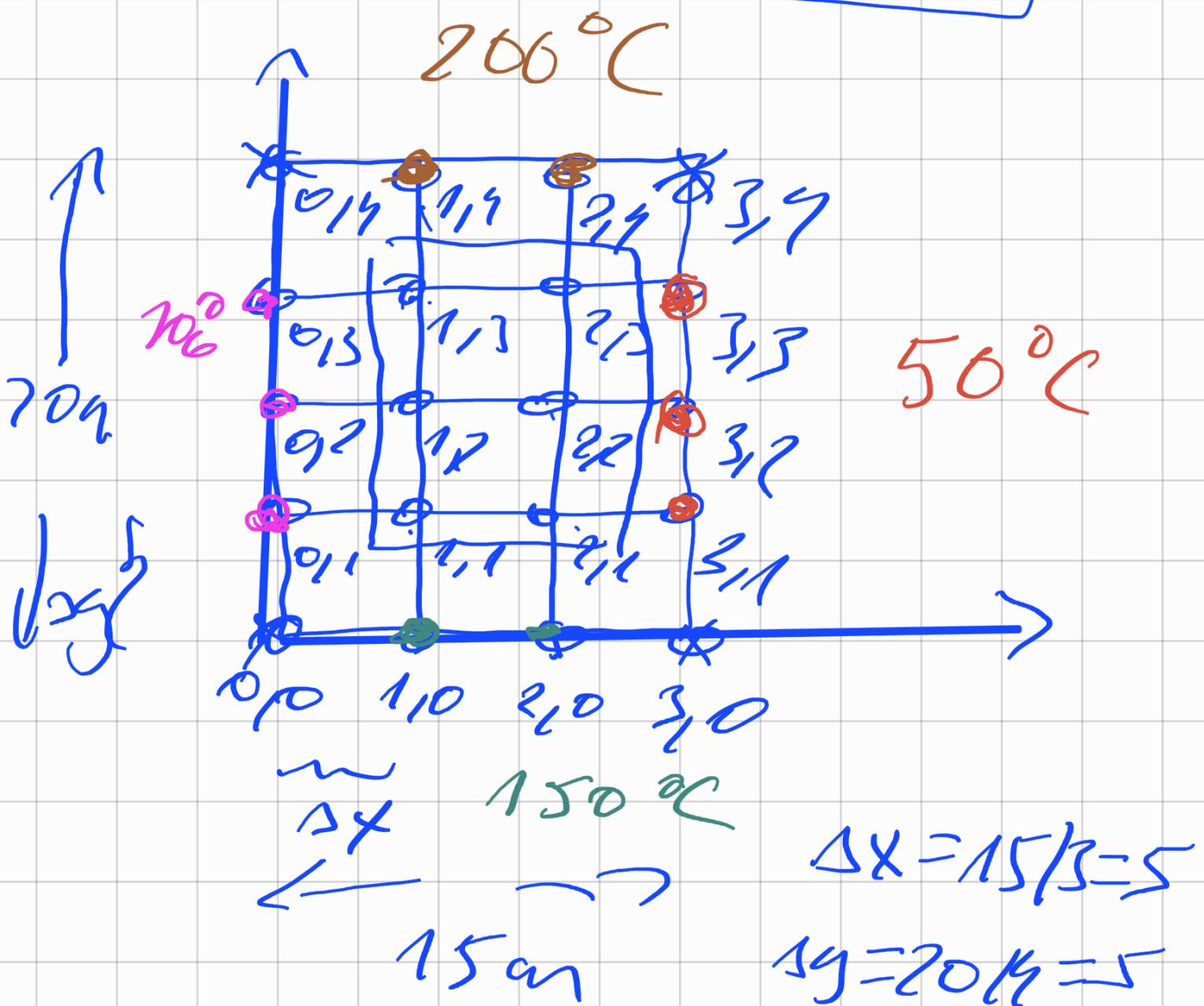
$$\bar{T}(i+1, j) - 4\bar{T}(i, j) + \bar{T}(i-1, j) +$$

$$\frac{T(i, j+1) + T(i, j-1)}{\Delta x^2} = 0$$

$$\frac{\alpha}{\delta} = 0 \rightarrow \alpha = 0$$

$$T(i+1,j) - 4T(i,j) + T(i-1,j) +$$

$$T(i,j+1) + T(i,j-1) = 0$$



$$T(1_{10}) = T(2_{10}) = 150^\circ$$

$$T(3_{11}) = T(3_{12}) = T(3_{13}) = 50$$

$$T(1_{14}) = T(2_{14}) = 200$$

$$T(0_{11}) = T(0_{12}) = T(0_{13}) = 100$$

① $i=1 \quad j=1$

$$T(2_{11}) - 4T(1_{11}) + T(0_{11}) + \\ T(1_{12}) + T(1_{10}) = 0$$

$$T(2_{11}) - 4T(1_{11}) + 100 + \\ T(1_{12}) + 150 = 0$$

$$T(2,1) - 4T(1,1) + T(1,2) = -250$$

$$\begin{array}{ccccccc|c} (1,1) & (2,1) & (1,2) & (2,2) & (1,3) & (2,3) & \\ \hline -4 & 1 & 1 & 0 & 0 & 0 & -250 \end{array}$$

② $i=2, j=1$

$$T(3,1) - 4T(2,1) + T(1,1) + T(2,2) + T(2,0) = 0$$

$$50 - 4T(2,1) + T(1,1) + T(2,2) + 150 = 0$$

$$-4T(2,1) + T(1,1) + T(1,2) = -200$$

$$\frac{(1,1)(2,1)(1,2)(2,2)(1,3)(2,3)}{1 \mid -4 \mid 0 \mid 1 \mid 0 \mid 0} = -200$$

③ $i=1, j=2$

$$T(2,2) - 4T(1,2) + T(0,2) =$$

$$T(1,3) + T(1,1) = 0$$

$$T(2,2) - 4T(1,2) + 100 +$$

$$T(1,3) + T(1,1) = 0$$

$$T(2,2) - 4T(1,2) + T(1,3) +$$

$$T(1,1) \leq -100$$

$$\frac{(1,1)(2,1)(1,2)(2,2)(1,3)(2,3))}{1 \mid 0 \mid -4 \mid 1 \mid 1 \mid 0 \mid -100}$$

(c) $i=2 \quad j=2$

$$T(3,2) - 4T(2,2) + T(1,2) +$$

$$T(2,3) + T(2,1) = 0$$

$$50 - 4T(2,2) + T(1,2) + T(2,3) +$$

$$T(2,1) = 0$$

$$-4T(2,2) + T(1,2) + T(2,3) +$$

$$T(2,1) = -50$$

$$\begin{array}{ccccccc} (1,1) & | & (2,1) & | & (1,2) & | & (2,2) & | & (1,3) & | & (2,3) \\ \hline 0 & | & 1 & | & 1 & | & -4 & | & 0 & | & 1 & | & -50 \end{array}$$

⑤ $i=1, j=3$

$$T(2,3) - 4T(1,3) + T(0,3) +$$

$$T(1,3) + T(1,2) = 0$$

$$T(2,3) - 4T(1,3) + 100 + 200 +$$

$$T(1,2) = 0$$

$$T(2,3) - 4T(1,3) + T(1,2) = -300$$

$$\begin{array}{ccccccc} (1,1) & | & (2,1) & | & (1,2) & | & (2,2) & | & (1,3) & | & (2,3) \\ \hline b & | & 0 & | & 1 & | & 0 & | & -4 & | & 1 & | & -300 \end{array}$$

⑥

$$i=2 \quad j=3$$

$$T(3,3) - 4T(2,3) + T(1,3) + \\ T(2,4) + T(2,2) = 0$$

$$50 - 4T(2,3) + T(1,3) +$$

$$200 + T(7,2) = 0$$

..

$$-4T(2,3) + T(1,3) + \dots$$

$$T(2,2) = -250$$

(1,1)	(2,1)	(1,2)	(2,2)	(1,3)	(2,3)	
0	0	0	1	1	-4	-250

$$y + 2y = 3$$

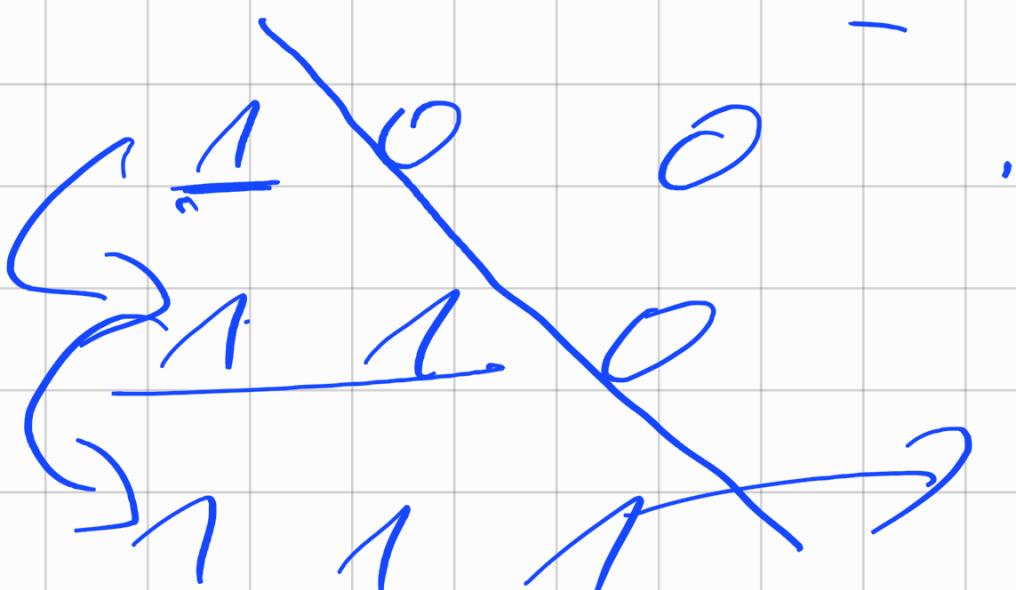
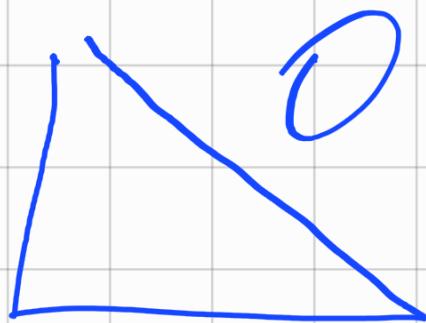
$$x + y = 1$$

$$\begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ 1 \end{bmatrix}$$

$$2x + y + ? = 4$$

$$3x + y + 2 = 6$$

$$2x + 2y + 22 = 6$$



$$\bar{A}x = b \quad | A^{-1}$$

$$AA^{-1}x = b \cdot A^{-1}$$

$$Ix = b \cdot A^{-1} \quad ? \frac{1}{z} = 1$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$\underline{b \cdot A^{-1} = x}$$