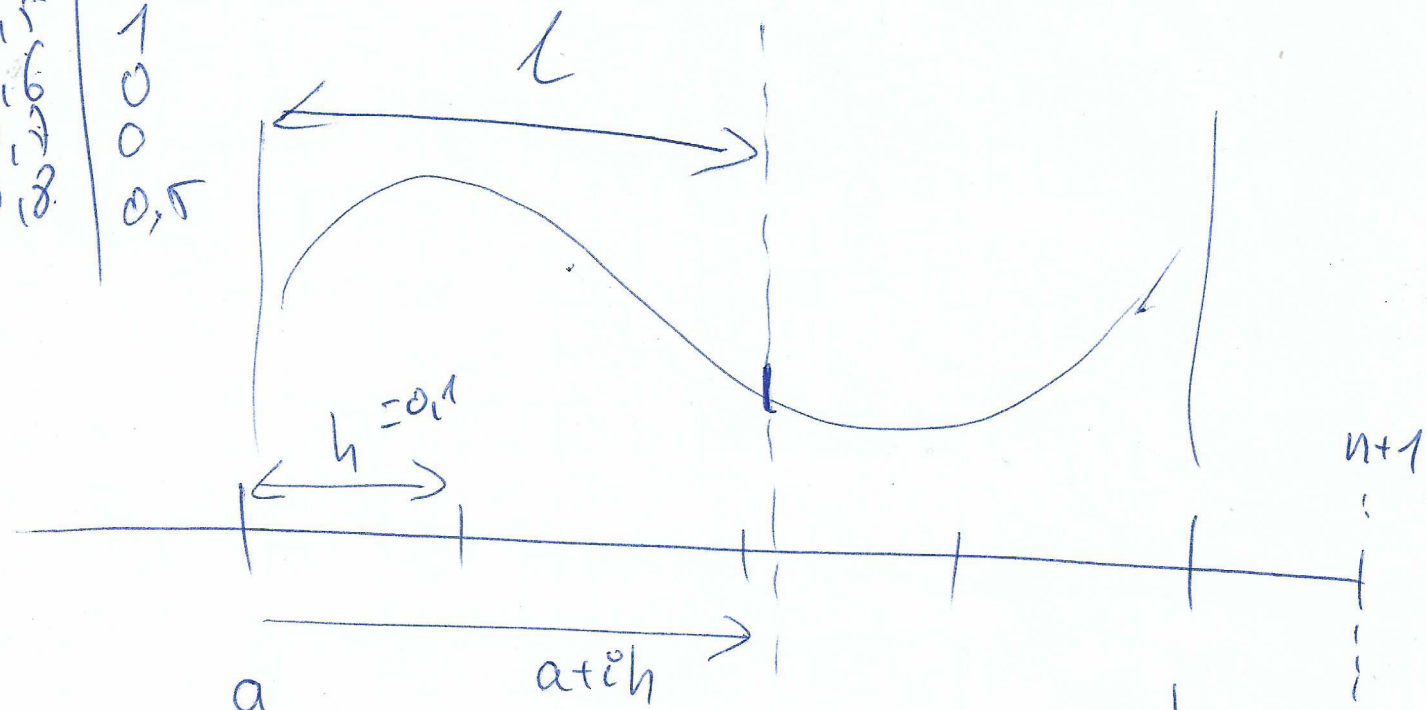
(1A) Wyznacz wartości współczynników aproksymacji trygonometrycznej zakładając postać Fuliera:

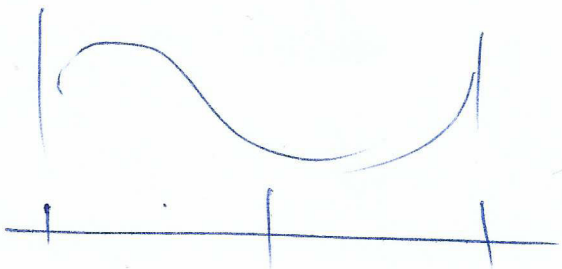
$$T_m(x) = a_0 + a_1\cos(cx) + a_2\sin(cx) + a_3\cos(2cx) + a_4\sin(2cx)$$

dla:

$n = 6 \quad n+1 = 7$

x_i	y_i
x_0 0,2	$0 - y_0$
0,3	$0 - y_2$
x_2 0,4	$1 - y_3$
y_3 0,5	1
0,6	0
0,7	0
0,8	0,5





$h(n+1)$

$\frac{h(n+1)}{2}$

$$l = \frac{0,1 \cdot 7}{2} = \frac{0,7}{2} = 0,35$$

$$c = \frac{\pi}{l} = \frac{3,14}{0,35} = 8,97$$

(2A) $H(a_0,a_1) = \sum (y_i - (a_0 + a_1\cos(cx) + b_1\sin(cx)\ldots)^2$ Zeigen Rechnung.

$$M \begin{vmatrix} 1 & \cos(cx_0) & \sin(cx_0) & \cos(2cx_0) & \sin(2cx_0) \\ 1 & \cos(cx_1) & \sin(cx_1) & \cos(2cx_0) & \sin(2cx_0) \\ & \vdots & & & \\ 1 & \cos(cx_6) & \sin(cx_6) & \cos(2cx_6) & \sin(2cx_6 \end{vmatrix} =$$

$$\ldots \quad (n+1)a_0 = \sum_{i=0}^{n} y_i, \quad \frac{n+1}{2} a_1 = \sum_{i=0}^{n} y_i \cos(cx)$$

$$\frac{n+1}{2} b_1 = \sum y_i \sin(cx) \ldots$$

$$a_0 = \frac{1}{n+1} \sum_{i=0}^{n} y_i \qquad a_1 = \frac{2}{n+1} \sum_{i=0}^{n} y_i \cdot \cos(cx)$$

$$b_1 = \frac{2}{n+1} \sum_{i=0}^{n} y_i \sin(cx)$$

$$a_2 = \frac{2}{n+1} \sum y_i \cos(2cx)$$

$$b_2 = \frac{2}{n+1} \sum y_i \sin(2cx)$$

$c = 8{,}97$

$L = 0{,}35$

(3A)

$\sum y_i = 2{,}5$

$a_0 = \frac{1}{7} \cdot 2{,}5$ $\quad$ ~~$a_1 = \frac{2}{7} \cdot 2{,}5 \cdot \cos($~~

$a_1 = \frac{2}{7}\sum = \frac{2}{7}\left(1 \cdot \cos(C \cdot 0{,}4) + 1 \cdot \cos(C \cdot 0{,}5) + 0{,}5 \cdot \cos(C \cdot 0{,}8)\right)$

$b_1 = \frac{2}{7}\sum y_i \sin(2x) = \frac{2}{7}\left(1 \cdot \sin(0{,}4C) + 1 \sin(0{,}5C) + 0{,}5 \cdot \sin(0{,}8C)\right)$

$a_2 = \frac{2}{7}\sum y_i \cdot \cos(2Cx) =$

$= \frac{2}{7}\left(1 \cdot \cos(2 \cdot 0{,}4 \cdot C) + 1 \cdot \cos(2 \cdot 0{,}5C) + 0{,}5 \cdot \sin(0{,}8 \cdot 2C)\right)$

$b_2 = \frac{2}{7}\left(\sin(2 \cdot 0{,}4 \cdot C) + \underset{\sin}{\cancel{\cos}}(2 \cdot 0{,}5C) + 0{,}5\sin(2 \cdot 0{,}8C)\right)$

$a_0 = \frac{2{,}5}{7} = 0{,}35$

$a_1 = \frac{2}{7}\left[\cos(0{,}4C) + \cos(0{,}5C) + \frac{1}{2}\left(\cos 0{,}8C\right)\right] = -0{,}232$

$-0{,}902 + -0{,}225 + 0{,}313$

$b_1 = \frac{2}{7}\left[\sin(0{,}4C) + \sin(0{,}5C) + \frac{1}{2}\sin(0{,}8C)\right] = -0{,}043$

$-0{,}431 + -0{,}974 + 0{,}389$

$a_2 = \frac{2}{7}\left[\cos(2 \cdot 0{,}4C) + \cos(2 \cdot 0{,}5C) + \frac{1}{2}\cos(2 \cdot 0{,}8)\right] = -0{,}348$

$0{,}696 + -0{,}898 + -1{,}01$

$b_2 = \frac{2}{7}\left[\sin(0{,}8C) + \sin(C) + \frac{1}{2}(\sin(1{,}6C))\right] = 0{,}4872$

(4A)

$$T_{(x)} = 0,35 - 0,232 \cdot \cos\left(\frac{\pi}{0,35} x\right) - 0,043 \cdot \sin\left(\frac{\pi}{0,35} x\right) - 0,348 \cdot \cos\left(\frac{2\pi}{0,35} x\right) + 0,4872 \cdot \sin\left(\frac{2\pi}{0,35} x\right)$$