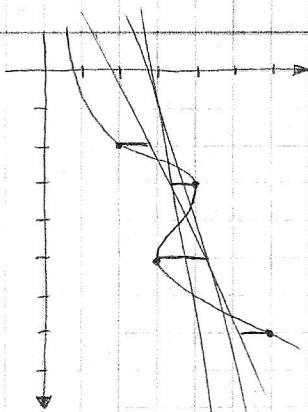


$$x_1^{(n)} = C + D \cdot x^{(n)}$$

$$x^{(0)} = \begin{bmatrix} 2 \\ 2 \\ 1/4 \end{bmatrix} \quad x^{(1)} = \begin{bmatrix} 2 \\ 2 \\ 1/4 \end{bmatrix} + \begin{bmatrix} 0 & -1/3 & 1/3 \\ 1/5 & 0 & 1/5 \\ 1/4 & -1/2 & 0 \end{bmatrix} \begin{bmatrix} 2 \\ 2 \\ 1/4 \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \\ 1/4 \end{bmatrix} + \begin{bmatrix} -1/2 \\ 9/20 \\ -3/4 \end{bmatrix} = \begin{bmatrix} 1.5 \\ 2.9/20 \\ -5/4 \end{bmatrix}$$

$$x^{(2)} = C + D \cdot x^{(1)} = \begin{bmatrix} 2 \\ 2 \\ 1/4 \end{bmatrix} + \begin{bmatrix} 0 & -1/3 & 1/3 \\ 1/5 & 0 & 1/5 \\ 1/4 & -1/2 & 0 \end{bmatrix} \begin{bmatrix} 1.5 \\ 2.9/20 \\ -5/4 \end{bmatrix} = \begin{bmatrix} 0.7667 \\ 2.0333 \\ -1.3292 \end{bmatrix}$$

## INTERPOLACJE



aproxymacje (f-cia, przechodzi w punktach drugiej i 2. stopnia, gran. bieżąca)

Wzór Lagrange'a

$$L_n(x) = \sum_{i=0}^n y_i \frac{(x-x_0) \dots (x-x_{i-1})(x-x_{i+1}) \dots (x-x_n)}{(x_i-x_0) \dots (x_i-x_{i-1})(x_i-x_{i+1}) \dots (x_i-x_n)}$$

i	0	1	2	3
x <sub>i</sub>	-2	0	1	3
y <sub>i</sub>	1	-2	2	1

$$L_n(x) = 1 \cdot \frac{(x+2)(x-0)(x-1)(x-3)}{(-2-0)(-2-1)(-2-3)} + (-2) \cdot \frac{(x+2)(x-0)(x-1)(x-3)}{(0+2)(0-0)(0-1)(0-3)} + 2 \cdot \frac{(x+2)(x-0)(x-1)(x-3)}{(1+2)(1-0)(1-1)(1-3)} + 1 \cdot \frac{(x+2)(x-0)(x-1)(x-3)}{(3+2)(3-0)(3-1)(3-3)} =$$

$$= \frac{x^3 - 4x^2 + 3x}{-30} + \frac{(-x^3 - 2x^2 - 5x)}{3} + \frac{x^3 - x^2 - 6x}{3} + \frac{x^3 + x^2 - 2x}{30} =$$

$$= \frac{2}{3}x^3 + \frac{1}{6}x^2 + 2x$$

Lagrange  
Newtona

Metoda Eitkena

$$N_{ij} = \frac{y_i}{x_i - x_j} \quad N_{ij,k} = \frac{N_{ij} \cdot x_k - x_j}{x_k - x_j}$$

$$N_{0,1,2 \dots m} = \frac{N_{0,1,2 \dots m-2,m-1} \cdot x_{n-1} - x}{x_n - x}$$

$$x_n - x_{n-1}$$

$$(x_{i+1}, y_{i+1}) \quad i = 0, 1, \dots, n$$

$x_0$	$y_0$	$N_{0,1}$	$N_{0,1,2}$	$N_{0,1,2,3}$	$N_{0,1,2,3,4}$
$x_1$	$y_1$	$N_{1,2}$	$N_{1,2,3}$	$N_{1,2,3,4}$	$N_{1,2,3,4,5}$
$x_2$	$y_2$	$N_{2,3}$	$N_{2,3,4}$	$N_{2,3,4,5}$	$N_{2,3,4,5,6}$
$x_3$	$y_3$	$N_{3,4}$	$N_{3,4,5}$	$N_{3,4,5,6}$	$N_{3,4,5,6,7}$
$x_4$	$y_4$	$N_{4,5}$	$N_{4,5,6}$	$N_{4,5,6,7}$	$N_{4,5,6,7,8}$
$x_5$	$y_5$	$N_{5,6}$	$N_{5,6,7}$	$N_{5,6,7,8}$	$N_{5,6,7,8,9}$
$x_6$	$y_6$	$N_{6,7}$	$N_{6,7,8}$	$N_{6,7,8,9}$	$N_{6,7,8,9,10}$
$x_7$	$y_7$	$N_{7,8}$	$N_{7,8,9}$	$N_{7,8,9,10}$	$N_{7,8,9,10,11}$
$x_8$	$y_8$	$N_{8,9}$	$N_{8,9,10}$	$N_{8,9,10,11}$	$N_{8,9,10,11,12}$
$x_9$	$y_9$	$N_{9,10}$	$N_{9,10,11}$	$N_{9,10,11,12}$	$N_{9,10,11,12,13}$
$x_{10}$	$y_{10}$	$N_{10,11}$	$N_{10,11,12}$	$N_{10,11,12,13}$	$N_{10,11,12,13,14}$
$x_{11}$	$y_{11}$	$N_{11,12}$	$N_{11,12,13}$	$N_{11,12,13,14}$	$N_{11,12,13,14,15}$
$x_{12}$	$y_{12}$	$N_{12,13}$	$N_{12,13,14}$	$N_{12,13,14,15}$	$N_{12,13,14,15,16}$
$x_{13}$	$y_{13}$	$N_{13,14}$	$N_{13,14,15}$	$N_{13,14,15,16}$	$N_{13,14,15,16,17}$
$x_{14}$	$y_{14}$	$N_{14,15}$	$N_{14,15,16}$	$N_{14,15,16,17}$	$N_{14,15,16,17,18}$
$x_{15}$	$y_{15}$	$N_{15,16}$	$N_{15,16,17}$	$N_{15,16,17,18}$	$N_{15,16,17,18,19}$
$x_{16}$	$y_{16}$	$N_{16,17}$	$N_{16,17,18}$	$N_{16,17,18,19}$	$N_{16,17,18,19,20}$
$x_{17}$	$y_{17}$	$N_{17,18}$	$N_{17,18,19}$	$N_{17,18,19,20}$	$N_{17,18,19,20,21}$
$x_{18}$	$y_{18}$	$N_{18,19}$	$N_{18,19,20}$	$N_{18,19,20,21}$	$N_{18,19,20,21,22}$
$x_{19}$	$y_{19}$	$N_{19,20}$	$N_{19,20,21}$	$N_{19,20,21,22}$	$N_{19,20,21,22,23}$
$x_{20}$	$y_{20}$	$N_{20,21}$	$N_{20,21,22}$	$N_{20,21,22,23}$	$N_{20,21,22,23,24}$
$x_{21}$	$y_{21}$	$N_{21,22}$	$N_{21,22,23}$	$N_{21,22,23,24}$	$N_{21,22,23,24,25}$
$x_{22}$	$y_{22}$	$N_{22,23}$	$N_{22,23,24}$	$N_{22,23,24,25}$	$N_{22,23,24,25,26}$
$x_{23}$	$y_{23}$	$N_{23,24}$	$N_{23,24,25}$	$N_{23,24,25,26}$	$N_{23,24,25,26,27}$
$x_{24}$	$y_{24}$	$N_{24,25}$	$N_{24,25,26}$	$N_{24,25,26,27}$	$N_{24,25,26,27,28}$
$x_{25}$	$y_{25}$	$N_{25,26}$	$N_{25,26,27}$	$N_{25,26,27,28}$	$N_{25,26,27,28,29}$
$x_{26}$	$y_{26}$	$N_{26,27}$	$N_{26,27,28}$	$N_{26,27,28,29}$	$N_{26,27,28,29,30}$
$x_{27}$	$y_{27}$	$N_{27,28}$	$N_{27,28,29}$	$N_{27,28,29,30}$	$N_{27,28,29,30,31}$
$x_{28}$	$y_{28}$	$N_{28,29}$	$N_{28,29,30}$	$N_{28,29,30,31}$	$N_{28,29,30,31,32}$
$x_{29}$	$y_{29}$	$N_{29,30}$	$N_{29,30,31}$	$N_{29,30,31,32}$	$N_{29,30,31,32,33}$
$x_{30}$	$y_{30}$	$N_{30,31}$	$N_{30,31,32}$	$N_{30,31,32,33}$	$N_{30,31,32,33,34}$
$x_{31}$	$y_{31}$	$N_{31,32}$	$N_{31,32,33}$	$N_{31,32,33,34}$	$N_{31,32,33,34,35}$
$x_{32}$	$y_{32}$	$N_{32,33}$	$N_{32,33,34}$	$N_{32,33,34,35}$	$N_{32,33,34,35,36}$
$x_{33}$	$y_{33}$	$N_{33,34}$	$N_{33,34,35}$	$N_{33,34,35,36}$	$N_{33,34,35,36,37}$
$x_{34}$	$y_{34}$	$N_{34,35}$	$N_{34,35,36}$	$N_{34,35,36,37}$	$N_{34,35,36,37,38}$
$x_{35}$	$y_{35}$	$N_{35,36}$	$N_{35,36,37}$	$N_{35,36,37,38}$	$N_{35,36,37,38,39}$
$x_{36}$	$y_{36}$	$N_{36,37}$	$N_{36,37,38}$	$N_{36,37,38,39}$	$N_{36,37,38,39,40}$
$x_{37}$	$y_{37}$	$N_{37,38}$	$N_{37,38,39}$	$N_{37,38,39,40}$	$N_{37,38,39,40,41}$
$x_{38}$	$y_{38}$	$N_{38,39}$	$N_{38,39,40}$	$N_{38,39,40,41}$	$N_{38,39,40,41,42}$
$x_{39}$	$y_{39}$	$N_{39,40}$	$N_{39,40,41}$	$N_{39,40,41,42}$	$N_{39,40,41,42,43}$
$x_{40}$	$y_{40}$	$N_{40,41}$	$N_{40,41,42}$	$N_{40,41,42,43}$	$N_{40,41,42,43,44}$
$x_{41}$	$y_{41}$	$N_{41,42}$	$N_{41,42,43}$	$N_{41,42,43,44}$	$N_{41,42,43,44,45}$
$x_{42}$	$y_{42}$	$N_{42,43}$	$N_{42,43,44}$	$N_{42,43,44,45}$	$N_{42,43,44,45,46}$
$x_{43}$	$y_{43}$	$N_{43,44}$	$N_{43,44,45}$	$N_{43,44,45,46}$	$N_{43,44,45,46,47}$
$x_{44}$	$y_{44}$	$N_{44,45}$	$N_{44,45,46}$	$N_{44,45,46,47}$	$N_{44,45,46,47,48}$
$x_{45}$	$y_{45}$	$N_{45,46}$	$N_{45,46,47}$	$N_{45,46,47,48}$	$N_{45,46,47,48,49}$
$x_{46}$	$y_{46}$	$N_{46,47}$	$N_{46,47,48}$	$N_{46,47,48,49}$	$N_{46,47,48,49,50}$
$x_{47}$	$y_{47}$	$N_{47,48}$	$N_{47,48,49}$	$N_{47,48,49,50}$	$N_{47,48,49,50,51}$
$x_{48}$	$y_{48}$	$N_{48,49}$	$N_{48,49,50}$	$N_{48,49,50,51}$	$N_{48,49,50,51,52}$
$x_{49}$	$y_{49}$	$N_{49,50}$	$N_{49,50,51}$	$N_{49,50,51,52}$	$N_{49,50,51,52,53}$
$x_{50}$	$y_{50}$	$N_{50,51}$	$N_{50,51,52}$	$N_{50,51,52,53}$	$N_{50,51,52,53,54}$
$x_{51}$	$y_{51}$	$N_{51,52}$	$N_{51,52,53}$	$N_{51,52,53,54}$	$N_{51,52,53,54,55}$
$x_{52}$	$y_{52}$	$N_{52,53}$	$N_{52,53,54}$	$N_{52,53,54,55}$	$N_{52,53,54,55,56}$
$x_{53}$	$y_{53}$	$N_{53,54}$	$N_{53,54,55}$	$N_{53,54,55,56}$	$N_{53,54,55,56,57}$
$x_{54}$	$y_{54}$	$N_{54,55}$	$N_{54,55,56}$	$N_{54,55,56,57}$	$N_{54,55,56,57,58}$
$x_{55}$	$y_{55}$	$N_{55,56}$	$N_{55,56,57}$	$N_{55,56,57,58}$	$N_{55,56,57,58,59}$
$x_{56}$	$y_{56}$	$N_{56,57}$	$N_{56,57,58}$	$N_{56,57,58,59}$	$N_{56,57,58,59,60}$
$x_{57}$	$y_{57}$	$N_{57,58}$	$N_{57,58,59}$	$N_{57,58,59,60}$	$N_{57,58,59,60,61}$
$x_{58}$	$y_{58}$	$N_{58,59}$	$N_{58,59,60}$	$N_{58,59,60,61}$	$N_{58,59,60,61,62}$
$x_{59}$	$y_{59}$	$N_{59,60}$	$N_{59,60,61}$	$N_{59,60,61,62}$	$N_{59,60,61,62,63}$
$x_{60}$	$y_{60}$	$N_{60,61}$	$N_{60,61,62}$	$N_{60,61,62,63}$	$N_{60,61,62,63,64}$
$x_{61}$	$y_{61}$	$N_{61,62}$	$N_{61,62,63}$	$N_{61,62,63,64}$	$N_{61,62,63,64,65}$
$x_{62}$	$y_{62}$	$N_{62,63}$	$N_{62,63,64}$	$N_{62,63,64,65}$	$N_{62,63,64,65,66}$
$x_{63}$	$y_{63}$	$N_{63,64}$	$N_{63,64,65}$	$N_{63,64,65,66}$	$N_{63,64,65,66,67}$
$x_{64}$	$y_{64}$	$N_{64,65}$	$N_{64,65,66}$	$N_{64,65,66,67}$	$N_{64,65,66,67,68}$
$x_{65}$	$y_{65}$	$N_{65,66}$	$N_{65,66,67}$	$N_{65,66,67,68}$	$N_{65,66,67,68,69}$
$x_{66}$	$y_{66}$	$N_{66,67}$	$N_{66,67,68}$	$N_{66,67,68,69}$	$N_{66,67,68,69,70}$
$x_{67}$	$y_{67}$	$N_{67,68}$	$N_{67,68,69}$	$N_{67,68,69,70}$	$N_{67,68,69,70,71}$
$x_{68}$	$y_{68}$	$N_{68,69}$	$N_{68,69,70}$	$N_{68,69,70,71}$	$N_{68,69,70,71,72}$
$x_{69}$	$y_{69}$	$N_{69,70}$	$N_{69,70,71}$	$N_{69,70,71,72}$	$N_{69,70,71,72,73}$
$x_{70}$	$y_{70}$	$N_{70,71}$	$N_{70,71,72}$	$N_{70,71,72,73}$	$N_{70,71,72,73,74}$
$x_{71}$	$y_{71}$	$N_{71,72}$	$N_{71,72,73}$	$N_{71,72,73,74}$	$N_{71,72,73,74,75}$
$x_{72}$	$y_{72}$	$N_{72,73}$	$N_{72,73,74}$	$N_{72,73,74,75}$	$N_{72,73,74,75,76}$
$x_{73}$	$y_{73}$	$N_{73,74}$	$N_{73,74,75}$	$N_{73,74,75,76}$	$N_{73,74,75,76,77}$
$x_{74}$	$y_{74}$	$N_{74,75}$	$N_{74,75,76}$	$N_{74,75,76,77}$	$N_{74,75,76,77,78}$
$x_{75}$	$y_{75}$	$N_{75,76}$	$N_{75,76,77}$	$N_{75,76,77,78}$	$N_{75,76,77,78,79}$
$x_{76}$	$y_{76}$	$N_{76,77}$	$N_{76,77,78}$	$N_{76,77,78,79}$	$N_{76,77,78,79,80}$
$x_{77}$	$y_{77}$	$N_{77,78}$	$N_{77,78,79}$	$N_{77,78,79,80}$	$N_{77,78,79,80,81}$
$x_{78}$	$y_{78}$	$N_{78,79}$	$N_{78,79,80}$	$N_{78,79,80,81}$	$N_{78,79,80,81,82}$
$x_{79}$	$y_{79}$	$N_{79,80}$	$N_{79,80,81}$	$N_{79,80,81,82}$	$N_{79,80,81,82,83}$
$x_{80}$	$y_{80}$	$N_{80,81}$	$N_{80,81,82}$	$N_{80,81,82,83}$	$N_{80,81,82,83,84}$
$x_{81}$	$y_{81}$	$N_{81,82}$	$N_{81,82,83}$	$N_{81,82,83,84}$	$N_{81,82,83,84,85}$
$x_{82}$	$y_{82}$	$N_{82,83}$	$N_{82,83,84}$	$N_{82,83,84,85}$	$N_{82,83,84,85,86}$
$x_{83}$	$y_{83}$	$N_{83,84}$	$N_{83,84,85}$	$N_{83,84,85,86}$	$N_{83,84,85,86,87}$
$x_{84}$	$y_{84}$	$N_{84,85}$	$N_{84,85,86}$	$N_{84,85,86,87}$	$N_{84,85,86,87,88}$
$x_{85}$	$y_{85}$	$N_{85,86}$	$N_{85,86,87}$	$N_{85,86,87,88}$	$N_{85,86,87,88,89}$
$x_{86}$	$y_{86}$	$N_{86,87}$	$N_{86,87,88}$	$N_{86,87,88,89}$	$N_{86,87,88,89,90}$
$x_{87}$	$y_{87}$	$N_{87,88}$	$N_{87,88,89}$	$N_{87,88,89,90}$	$N_{87,88,89,90,91}$
$x_{88}$	$y_{88}$	$N_{88,89}$	$N_{88,89,90}$	$N_{88,89,90,91}$	$N_{88,89,90,91,92}$
$x_{89}$	$y_{89}$	$N_{89,90}$	$N_{89,90,91}$	$N_{89,90,91,92}$	$N_{89,90,91,92,93}$
$x_{90}$	$y_{90}$	$N_{90,91}$	$N_{90,91,92}$	$N_{90,91,92,93}$	$N_{90,91,92,93,94}$
$x_{91}$	$y_{91}$	$N_{91,92}$	$N_{91,92,93}$	$N_{91,92,93,94}$	$N_{91,92,93,94,95}$
$x_{92}$	$y_{92}$	$N_{92,93}$	$N_{92,93,94}$	$N_{92,93,94,95}$	$N_{92,93,94,95,96}$
$x_{93}$	$y_{93}$	$N_{93,94}$	$N_{93,94,95}$	$N_{93,94,95,96}$	$N_{93,94,95,96,97}$
$x_{94}$	$y_{94}$	$N_{94,95}$	$N_{94,95,96}$	$N_{94,95,96,97}$	$N_{94,95,96,97,98}$
$x_{95}$	$y_{95}$	$N_{95,96}$	$N_{95,96,97}$	$N_{95,96,97,98}$	$N_{95,96,97,98,99}$
$x_{96}$	$y_{96}$	$N_{96,97}$	$N_{96,97,98}$	$N_{96,97,98,99}$	$N_{96,97,98,99,100}$
$x_{97}$	$y_{97}$	$N_{97,98}$	$N_{97,98,99}$	$N_{97,98,99,100}$	$N_{97,98,99,100,101}$
$x_{98}$	$y_{98}$	$N_{98,99}$	$N_{98,99,100}$	$N_{98,99,100,101}$	$N_{98,99,100,101,102}$
$x_{99}$	$y_{99}$	$N_{99,100}$	$N_{99,100,101}$	$N_{99,100,101,102}$	$N_{99,100,101,102,103}$