Aufgabe 1)

Skript 7 Seite 1

$f(x) = \ln(x^2)$

$x_0 = 2$

h	D_{i0}	D_{i1}	D_{i2}	D_{i3}	E_{i0}	E_{i1}	E_{i2}	E_{i3}
0.1	0.9758	0.9996	1.0000	1.000	0.01992	0.0004	0.0000	0.0000
0.05	0.9877	0.9999			0.0123	0.0001	0.0000	
0.025	0.9938	1.0000	1.0000		0.0062	0.0000		
0.0125	0.9969				0.0031			

D_{i0}	D_{i1}	D_{i2}	D_{i3}
D_{00}			
	$2D_{10} - D_{00} = D_{01}$		
D_{10}		$\frac{4D_{11} - D_{01}}{3} = D_{02}$	
	$2D_{20} - D_{10} = D_{11}$		$\frac{8D_{12} - D_{02}}{7} = D_{03}$
D_{20}		$\frac{4D_{21} - D_{11}}{3} = D_{12}$	
	$2D_{30} - D_{20} = D_{21}$		
D_{30}			

Aufgabe 3

$h = \frac{b-a}{n}$ $\quad x_0 = a \quad x_{n-1} = b$

$n = 1 \quad A_1 = \left(\frac{f(a)+f(b)}{2}\right) \cdot \frac{b-a}{1}$

$n = 2 \quad A_2 = \frac{f(a)+f(x_1)}{2} \cdot \frac{b-a}{2} + \frac{f(x_1)+f(b)}{2} \cdot \frac{b-a}{2}$

$= \left(\frac{b-a}{2}\right) \cdot \left(\frac{f(a)+f(x_1)}{2} + \frac{f(x_1)+f(b)}{2}\right)$

$= \left(\frac{b-a}{2}\right) \cdot \left(\frac{f(a)}{2} + \frac{f(x_1)}{2} + \frac{f(x_1)}{2} + \frac{f(b)}{2}\right)$

$= \left(\frac{b-a}{2}\right) \cdot \left(\frac{f(a)+f(b)}{2} + f(x_1)\right)$

$n = 3 \quad A_3 = \frac{f(a)+f(x_1)}{2} \cdot \frac{b-a}{3} + \frac{f(x_1)+f(x_2)}{2} \cdot \frac{b-a}{3} +$

$\frac{f(x_2)+f(b)}{2} \cdot \frac{b-a}{3}$

$= \frac{b-a}{3}\left(\frac{f(a)+f(x_1)}{2} + \frac{f(x_1)+f(x_2)}{2} + \frac{f(x_2)+f(b)}{2}\right)$

$= \frac{b-a}{3}\left(\frac{f(a)}{2} + \frac{f(x_1)}{2} + \frac{f(x_1)}{2} + \frac{f(x_2)}{2} + \frac{f(x_2)}{2} + \frac{f(b)}{2}\right)$

$= \frac{b-a}{3}\left(\frac{f(a)+f(b)}{2} + f(x_1) + f(x_2)\right)$

$n = n \quad A_n = \frac{b-a}{n} \cdot \left(\frac{f(a)+f(b)}{2} + f(x_1) + f(x_2) + \ldots + f(x_{n-1})\right)$

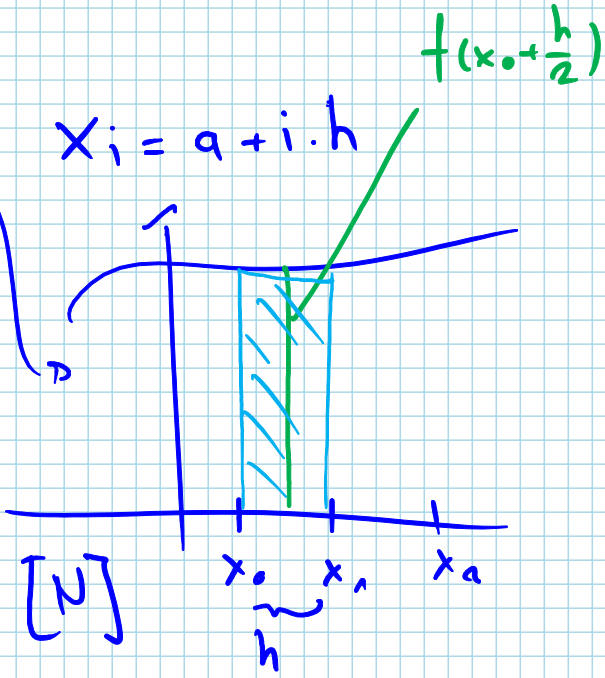
$= \frac{b-a}{n} \cdot \left(\frac{f(a)+f(b)}{2} + \sum_{i=1}^{n-1} f(x_i)\right)$

$= h \cdot \left(\frac{f(a)+f(b)}{2} + \sum_{i=1}^{n-1} f(x_i)\right)$

Aufgabe 4

$$Rf(h) = h \cdot \sum_{i=0}^{n-1} f(x_i + \frac{h}{2})$$

$$Tf(h) = h \cdot \left(\frac{f(a) + f(b)}{2} + \sum_{i=1}^{n-1} f(x_i) \right)$$



$$t - \int_{v(t_0)}^{v(t)} \frac{m}{R(v)} \, dv$$

$m = 10\,kg$

$R(v) = -v \cdot \sqrt{v}$ [N]

a)

$$dv \frac{m}{R} = \frac{kg}{\frac{kg \cdot m}{s^2}} \cdot \frac{m}{s} = s$$

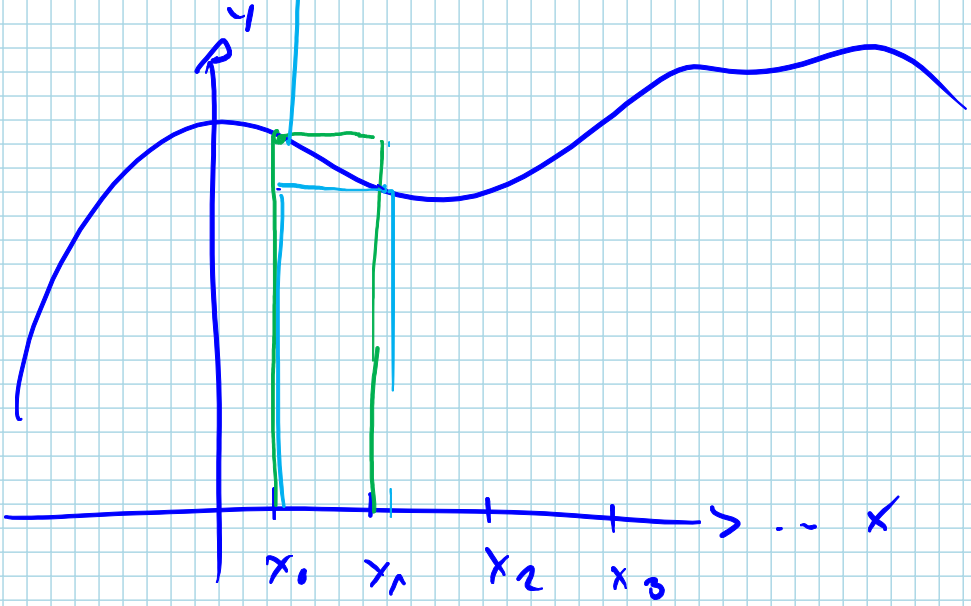
$$\int_{20}^{5} \dots = Rf(h) = -3 \cdot \sum_{i=0}^{4} \frac{10}{-(20 + i \cdot -3 \; \frac{-3}{2}) \cdot \sqrt{20 + i \cdot 3 + \frac{3}{2}}}$$

$$\frac{5 - 20}{5}$$

$$= -30 \left(\frac{1}{-18.5\sqrt{18.5}} + \frac{1}{-15.5\sqrt{15.5}} + \frac{1}{-12.5\sqrt{12.5}} + \frac{1}{-9.5\sqrt{9.5}} + \frac{1}{-6.5\sqrt{6.5}} \right)$$

$$= 4.38\,s$$

b)



$$\Rightarrow \frac{\square + \square}{2}$$

$$x_i = a + ih$$

$$\int_{20}^{5} \frac{1}{-v\sqrt{v}}\,dv = h\left(\frac{f(a)+f(b)}{2} + \sum_{i=0}^{n-1} f(x_i)\right)$$

$h = -3$

$$f(x) = -\frac{10}{x\cdot\sqrt{x}}$$

$$= -3\left(\frac{1}{2}\cdot \dots + -10\left(\frac{1}{20\sqrt{20}} + \frac{1}{17\cdot\sqrt{17}} + \frac{1}{14\cdot\sqrt{14}} + \frac{1}{11\cdot\sqrt{11}} + \frac{1}{8\cdot\sqrt{8}}\right)\right)$$

$$= 4.993\ldots$$