Aufgabe 1, Serie 2

$D_1 f(x_0, h)$ $\quad f(x) = \ln(x^2)$ $\quad x_0 = 2$

$h_1 = 0.1$ $\quad h_2 = 0.05$ $\quad h_3 = 0.025$ $\quad h_4 = 0.0125$

$$D_{ik} = \frac{2^k D_{i+1,k-1} - D_{i,k-1}}{2^k - 1}$$

$$D_1 f(x_0, h) = \frac{f(x_0 + h) - f(x_0)}{h}$$

$$h_1 := D_{00} = \frac{f(2.1^2) - f(4)}{0.1} = 0.9758$$

$$h_2 := D_{10} = \frac{f(2.05^2) - f(4)}{0.05} = 0.9877$$

$$h_3 := D_{20} = \frac{f(2.025^2) - f(4)}{0.025} = 0.9938$$

$$h_4 := D_{30} = \frac{f(2.0125^2) - f(4)}{0.0125} = 0.9969$$

D_{i0}	D_{i1}	D_{i2}	D_{i3}
D_{00}	D_{01}	D_{02}	D_{03}
0.9758	0.9996	1.0	1.0
0.0242	$3.9428 e^{-04}$	$3.6464 \cdot e^{-06}$	$1.3086 \cdot e^{-08}$
D_{10}	D_{11}	D_{12}	
0.9877	0.9999	1.0	
0.0123	$1.0150 e^{-04}$	$4.7163 \cdot e^{-07}$	
D_{20}	D_{21}		
0.9958	1.0		
0.0062	$1.0150 e^{-04}$		
D_{30}			
0.9969			
0.0031			

E_{i0} E_{i1} E_{i2}

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

$f'(x) = 2 \cdot \frac{1}{x} = \frac{2}{x}$

$f'(x_0) = \frac{2}{2} = 1$

$E_{ik} = |D_{ik} - f'(x_0)|$