

Transformationstabelle

		Abtastung			
		$f(t)$ \uparrow L L^{-1} \downarrow $F(s)$	f_k \uparrow Z Z^{-1} \downarrow $F(z)$		
		②			
 	Nr.	Zeitfunktionen	(Zahlen)folge	Laplace-Transformierte	Z-Transformierte
		$f(t)$ für $t \geq 0$	f_k für $k \geq 0$	$F(p) = \int_0^{\infty} f(t) \cdot e^{-pt} dt$	$F(z) = \sum_{k=0}^{\infty} f_k z^{-k}$
Dirac-Impuls	1	$\delta(t)$	nicht definiert !	1	nicht definiert !
Einheitsprung Heaviside-Fkt.	2	1 ($\sigma(t)$)	1 ($\sigma(kT) = 1 = 1^k$)	$\frac{1}{p}$	$M_0 = \frac{z}{z-1} = \frac{1}{1-z^{-1}}$
Rampen-Fkt.	3	$\frac{t}{T_1}$	$\frac{kT}{T_1} = a \cdot k$; $a = \frac{T}{T_1}$	$\frac{1}{p^2 T_1}$	$M_1 = \frac{a \cdot z}{(z-1)^2}$
	4	$\left(\frac{t}{T_1}\right)^n$	$\left(\frac{kT}{T_1}\right)^n = a^n \cdot k^n$; $a = \frac{T}{T_1}$	$\frac{n!}{p^{n+1} T_1^n}$	$M_n = \frac{n!}{z-1} \sum_{i=0}^{n-1} M_i \frac{a^{n-i}}{(n-i)!}$
e-Funktion 	5	$e^{-\frac{t}{T_1}}$	$e^{-\frac{kT}{T_1}} = b^k$; $b = e^{-\frac{T}{T_1}}$	$\frac{1}{p + \frac{1}{T_1}}$	$N_0 = \frac{\frac{z}{b}}{\frac{z}{b} - 1} = \frac{z}{z-b}$

	6	$\frac{t}{T_1} e^{-\frac{t}{T_1}}$	$\frac{kT}{T_1} e^{-\frac{kT}{T_1}} = a \cdot k \cdot b^k; b = e^{-\frac{T}{T_1}}; a = \frac{T}{T_1}$	$\frac{1}{T_1} \frac{1}{\left(p + \frac{1}{T_1}\right)^2}$	$N_1 = \frac{a \frac{z}{b}}{\left(\frac{z}{b} - 1\right)^2} = \frac{abz}{(z-b)^2}$
	7	$\left(\frac{t}{T_1}\right)^n e^{-\frac{t}{T_1}}$	$\left(\frac{kT}{T_1}\right)^n e^{-\frac{kT}{T_1}} = a^n \cdot k^n \cdot b^k; b = e^{-\frac{T}{T_1}}; a = \frac{T}{T_1}$	$\frac{n!}{T_1^n} \frac{1}{\left(p + \frac{1}{T_1}\right)^{n+1}}$	$N_n = \frac{n!}{z - b} \sum_{i=0}^{n-1} N_i \frac{a^{n-i}}{(n-i)!}$
	8	$1 - e^{-\frac{t}{T_1}}$	$1^k - e^{-\frac{kT}{T_1}} = 1^k - b^k; b = e^{-\frac{T}{T_1}}$	$\frac{1}{p(1+pT_1)}$	$\frac{z}{z-1} - \frac{z}{z-b}$
	9	$e^{-\frac{t}{T_1}} - e^{-\frac{t}{T_2}}; T_1 \neq T_2$	$e^{-\frac{kT}{T_1}} - e^{-\frac{kT}{T_2}} = b_1^k - b_2^k; b_1 = e^{-\frac{T}{T_1}}; b_2 = e^{-\frac{T}{T_2}}$	$\frac{T_1 - T_2}{(1+pT_1)(1+pT_2)}$	$\frac{z}{z-b_1} - \frac{z}{z-b_2}$
	10	$\sin \omega t$	$\sin \omega kT = \sin ck; c = \omega T$	$\frac{\omega}{p^2 + \omega^2}$	$\frac{z \sin c}{z^2 - 2z \cos c + 1}$
	11	$\cos \omega t$	$\cos \omega kT = \cos ck; c = \omega T$	$\frac{p}{p^2 + \omega^2}$	$\frac{z(z - \cos c)}{z^2 - 2z \cos c + 1}$
Maple 				ztrans(f,k,z)  <div style="border: 1px solid black; padding: 2px; display: inline-block;">= sum(f(k)/z^k, k = 0..infinity)</div>	
				invztrans(f,k,z) 	
Mathematica 				ZTransform[expr, k, z] 	
				InverseZTransform[...] 	