APPENDIX I

*Table of Laplace and z-transforms**

No.	Continuous time	Laplace transform	Discrete time	*z*-transform
1	$\delta(t)$	1	$\delta(k)$	1
2	$1(t)$	$\frac{1}{s}$	$1(k)$	$\frac{z}{z-1}$
3	t	$\frac{1}{s^2}$	kT^{**}	$\frac{zT}{(z-1)^2}$
4	t^2	$\frac{2!}{s^3}$	$(kT)^2$	$\frac{z(z+1)T^2}{(z-1)^3}$
5	t^3	$\frac{3!}{s^4}$	$(kT)^3$	$\frac{z(z^2+4z+1)T^3}{(z-1)^4}$
6	$e^{-\alpha t}$	$\frac{1}{s+\alpha}$	$a^{k^{***}}$	$\frac{z}{z-a}$
7	$1-e^{-\alpha t}$	$\frac{\alpha}{s(s+\alpha)}$	$1-a^k$	$\frac{(1-a)z}{(z-1)(z-a)}$
8	$e^{-\alpha t}-e^{-\beta t}$	$\frac{\beta-\alpha}{(s+\alpha)(s+\beta)}$	a^k-b^k	$\frac{(a-b)z}{(z-a)(z-b)}$
9	$te^{-\alpha t}$	$\frac{1}{(s+\alpha)^2}$	kTa^k	$\frac{azT}{(z-a)^2}$
10	$\sin(\omega_n t)$	$\frac{\omega_n}{s^2+\omega_n^2}$	$\sin(\omega_n kT)$	$\frac{\sin(\omega_n T)_z}{z^2-2\cos(\omega_n T)z+1}$
11	$\cos(\omega_n t)$	$\frac{s}{s^2+\omega_n^2}$	$\cos(\omega_n kT)$	$\frac{z[z-\cos(\omega_n T)]}{z^2-2\cos(\omega_n T)z+1}$
12	$e^{-\varsigma\omega_n t}\sin(\omega_d t)$	$\frac{\omega_d}{(s+\varsigma\omega_n)^2+\omega_d^2}$	$e^{-\varsigma\omega_n kT}\sin(\omega_d kT)$	$\frac{e^{-\varsigma\omega_n T}\sin(\omega_d T)z}{z^2-2e^{-\varsigma\omega_n T}\cos(\omega_d T)z+e^{-2\varsigma\omega_n T}}$
13	$e^{-\varsigma\omega_n t}\cos(\omega_d t)$	$\frac{s+\varsigma\omega_n}{(s+\varsigma\omega_n)^2+\omega_d^2}$	$e^{-\varsigma\omega_n kT}\cos(\omega_d kT)$	$\frac{z[z-e^{-\varsigma\omega_n T}\cos(\omega_d T)]}{z^2-2e^{-\varsigma\omega_n T}\cos(\omega_d T)z+e^{-2\varsigma\omega_n T}}$
14	$\sinh(\beta t)$	$\frac{\beta}{s^2-\beta^2}$	$\sinh(\beta kT)$	$\frac{\sinh(\beta T)_z}{z^2-2\cosh(\beta T)z+1}$
15	$\cosh(\beta t)$	$\frac{s}{s^2-\beta^2}$	$\cosh(\beta kT)$	$\frac{z[z-\cosh(\beta T)]}{z^2-2\cosh(\beta T)z+1}$

* The discrete time functions are generally sampled forms of the continuous time functions.
** Sampling t gives kT, whose transform is obtained by multiplying the transform of k by T.
*** The function $e^{-\alpha kT}$ is obtained by setting $a = e^{-\alpha T}$.