

Laplace Transform	z-Transform	Derived in example...
1. 1	1	
2. $\frac{1}{s}$	$\frac{z}{z-1}$	
3. $\frac{1}{s^2}$	$\frac{T_s z}{(z-1)^2}$	
4. $\frac{1}{s^3}$	$\frac{T_s^2 z(z+1)}{2(z-1)^3}$	
5. $\frac{1}{s+a}$	$\frac{z}{z-e^{-aT_s}}$	Example 7.10
6. $\frac{1}{(s+a)^2}$	$T_s e^{-aT_s} \frac{z}{(z-e^{-aT_s})^2}$	Example 7.12
7. $\frac{1}{(s+a)(s+b)}, a \neq b$	$\frac{1}{b-a} \left[\frac{z(e^{-aT_s} - e^{-bT_s})}{(z-e^{-aT_s})(z-e^{-bT_s})} \right]$	Example 7.11
8. $\frac{1}{s+a} + \text{ZOH}$	$\frac{(1-e^{-aT_s})}{a(z-e^{-aT_s})}$	Example 7.16
9. $\frac{1}{(s+a)(s+b)} + \text{ZOH}$ $a \neq b$	$\frac{Az+B}{ab(b-a)(z-e^{-aT_s})(z-e^{-bT_s})}$ $A = b(1-e^{-aT_s}) - a(1-e^{-bT_s})$ $B = ae^{-aT_s} - be^{-bT_s} + (b-a)e^{-(a+b)T_s}$	Example 7.17
10. $\frac{(s+c)}{(s+a)(s+b)} + \text{ZOH}, a \neq b$	$\frac{Az+B}{ab(b-a)(z-e^{-aT_s})(z-e^{-bT_s})}$ $A = (c-b)ae^{-bT_s} + (a-c)be^{-aT_s} + (b-a)c$ $B = (a-c)be^{-bT_s} + a(c-b)e^{-aT_s} + c(b-a)e^{-aT_s}e^{-bT_s}$	Example 7.18
11. $\frac{1}{s^2 + 2\zeta\omega_n s + \omega_n^2} + \text{ZOH}$	$\frac{(1-B \sin(\omega_d T_s + \Phi))z + (B \sin(\omega_d T_s - \Phi) + A^2)}{\omega_n^2 (z^2 - 2A \cos(\omega_d T_s)z + A^2)}$ $A = e^{-\zeta\omega_n T_s}, B = \frac{A}{\sqrt{1-\zeta^2}}, \omega_d = \omega_n \sqrt{1-\zeta^2}$ $\tan \Phi = \frac{\sqrt{1-\zeta^2}}{\zeta}$	Example 7.19

Table 7.3. Table of Continuous to Discrete (Laplace to z) Transforms