

Appendix 1: List of useful equations

$T_r = \frac{2.2}{a}$	$T_s = \frac{4}{a}$	
$G(s) = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$	$\%OS = e^{\frac{-\pi\zeta}{\sqrt{1-\zeta^2}}} \times 100$	$\zeta = \frac{-\ln\left(\frac{\%OS}{100}\right)}{\sqrt{\pi^2 + \ln^2\left(\frac{\%OS}{100}\right)}}$
$T_p = \frac{\pi}{\omega_n\sqrt{1-\zeta^2}}$	$T_s = \frac{4}{\zeta\omega_n}$	
$e_{ss_step} = \frac{1}{1 + K_p}$	$K_p = \lim_{s \rightarrow 0} G(s)$	
$e_{ss_ramp} = \frac{1}{K_v}$	$K_v = \lim_{s \rightarrow 0} sG(s)$	
$e_{ss_parabola} = \frac{1}{K_a}$	$K_a = \lim_{s \rightarrow 0} s^2 G(s)$	