EE 475 Quiz #9

Name:_____

1. Use ζ, σ, ωn , and ωd to fill in the spaces below.
   1. Settling time is inversely proportional to ___σ___,
   2. Rise time is inversely proportional to ___ω_n___,
   3. Percentage overshoot is most directly determined by ___ζ___,
   4. Oscillation frequency is determined by ___ω_d___,
   5. Peak time is inversely proportional to ___ω_d___,

$\Leftarrow t_s = \frac{4}{\sigma}$ (2%)

$\Leftarrow t_r = \frac{2}{\omega_n}$

$\Leftarrow M_p = e^{-\frac{\pi\zeta}{\sqrt{1-\zeta^2}}}$

ω_n is not right
ω_d: damped natural frequency
ω_n: undamped natural frequency

$\Leftarrow t_p = \frac{\pi}{\omega_d}$

2. For a unity feedback control system with open loop transfer function $G_o(s)$,
   6. the position error constant Kp = ___$\lim_{s\to 0} G_o(s)$___,
   7. the velocity error constant Kv = ___$\lim_{s\to 0} sG_o(s)$___,
   8. the acceleration error constant Ka = ___$\lim_{s\to 0} s^2 G_o(s)$___,
3. In terms of these error constants,
   9. the steady state error due to a step input is $e_{ss2step}$= ___$\frac{1}{1+K_p}$___,
   10. the steady state error due to a ramp input is $e_{ss2ramp}$= ___$\frac{1}{K_v}$___,