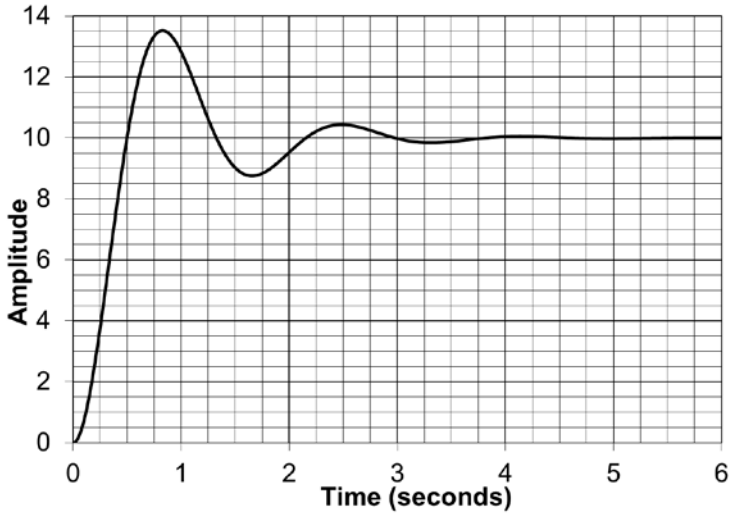
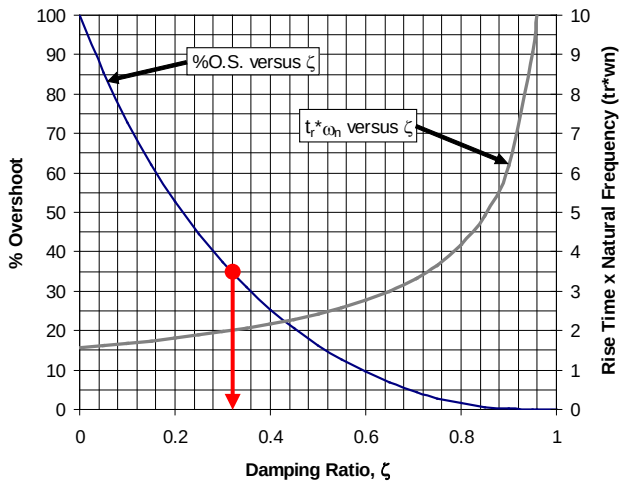
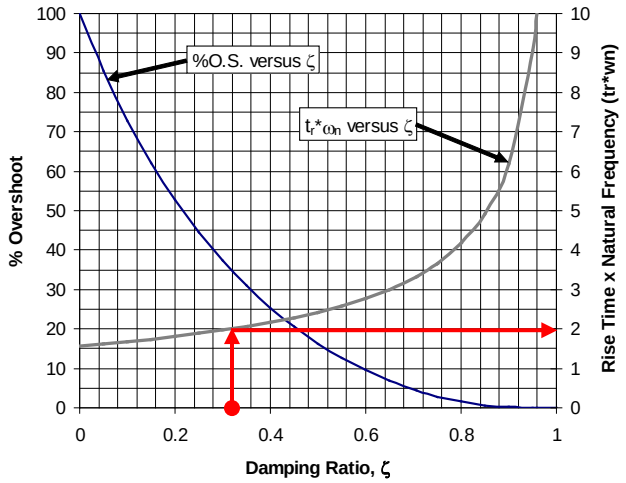
Below is a 2nd order step response. Find ζ and ω_n



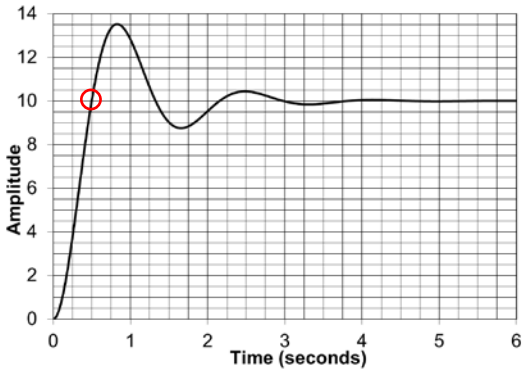
1. Find the plot from slide 105 (textbook pg 81)
2. Using the provided 2nd order response, calculate % overshoot
   a. $\%OS = \frac{peak\ value - SS\ value}{SS\ value - initial\ value} = \frac{13.5-10}{10-0} = 0.35 \rightarrow 35\ \%OS$
3. Mark the location of 35 %OS on the '%O.S. versus ζ' trace and then draw a vertical line down to find the value of ζ that corresponds to 35 %OS
   a. This results in $\zeta = 0.32$



4. Staying at the same value of ζ, draw a vertical line up until you intersect with the '$t_r * \omega_n$ versus ζ' trace and then draw a horizontal line to the right to find the value of $t_r \cdot \omega_n$
    a. This results in $t_r \cdot \omega_n = 2$



5. The rise time (t_r) is the time it takes to 1st cross the steady state value
    a. SS value = 10, $t_r = 0.5\ sec$



6. Since $t_r \cdot \omega_n = 2$ and $t_r = 0.5\ sec$, then $\omega_n = 4\ rad/s$
7. The final answer is $\zeta = 0.32$ and $\omega_n = 4\ rad/s$