Analysis:

3.) Step input 0.2 rad (open loop)

- underdamped (oscillates over + under ss value)
- oscillations seem large compared to ss value

$\theta_{ss} = 0.168$ rad
$T_r = 0.999$ sec
$\theta_{peak} = 0.585$ rad
$T_s = 405$ sec

4.) $T_r = 0.716$ sec
$T_s = 56.9$ sec
$\theta_{ss} = 0.0914$ rad (final value)
$\theta_{peak} = 0.181$

- faster rise time
- much faster settling time
- lower final value

5.)
- the graph for part 5 is the exact same as the graph for part 4
- this shows that both methods of solving are correct

6.)
- 5 roots shown on root locus
  - 5 X's (poles) and 5 O's (zero), which is to be expected
- As K (gain) is varied from $0 \to \infty$, there is no gain value where all 5 roots are in unshaded region
  - in fact, there is only 1 root that ever enters the unshaded region

- therefore, proportional controller doesn't work

7.) $C(s) = K \cdot \frac{(s+0.9)}{(s+3)}$

- also doesn't look like all roots enter unshaded region
- this lead compensator cannot be used to meet specified performance requirements (seems like wrong conclusion)

- not sure how to tell if performance criteria is met by K values (if what I said above is true, then none do)