Student:_____ ID:_____

1. Given the LTI system defined by the transfer function G(s),

$$G(s) = \frac{(s+80)}{(s^2+8s+k)},$$

- i. discuss the stability by varying $k \in (-\infty, +\infty)$.
- ii. calculate the analytic expression of the forced response to a step input of unitary amplitude (i.e., step response) for k = 15;
- iii. draw the qualitative step response for k = 160.
- 2. Given the LTI system defined by the transfer function G(s),

$$G(s) = \frac{18s}{(s^2 + 6s + 9)},$$

- i. draw the asymptotic Bode diagrams;
- ii. calculate the steady state response to the input signal $u(t) = 2\sin(3t)$.

Time available: 2 hours