$$\frac{b\,da}{ds} - a\frac{db}{ds} = 0$$

$$(s^2+7s-60)\cdot(3s^2+8s-22) - (s+8)(s^2-4s+10)\cdot(2s+7) = 0$$

$$s = \boxed{-18.96,\ -4.636,\ 1.006,}$$

$$\theta = \frac{180+360(k)}{2} = 270, 90$$

#2) No value one of the poles on the RHP (not sure which b/c handdrawn not sufficient info) will move to the right after reaching the IR axis @ 1.006. This will stay in the RHP forever.

#3) No. the remove oscillatory behavior, all poles @ IR axis. We can do that by making the 2 poles in RHP @ 1.006 on IR. the pole in the left will also be on IR. However it is

NOT STABLE

#4) The minimum value of overshoot occurs with two poles are @ 1.006 on the right side In fact, these two poles on the right are not only slow but also not stable (I count them as slow). $1+K\,G(s) = 0$

$$1 + K\,\frac{(1.006+12)(1.006-5)}{(1.006+8)(1.006^2-4\cdot1.006+10)^2} = 0$$

$$K = \boxed{1.2115}$$