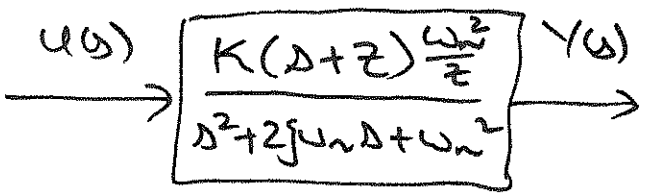
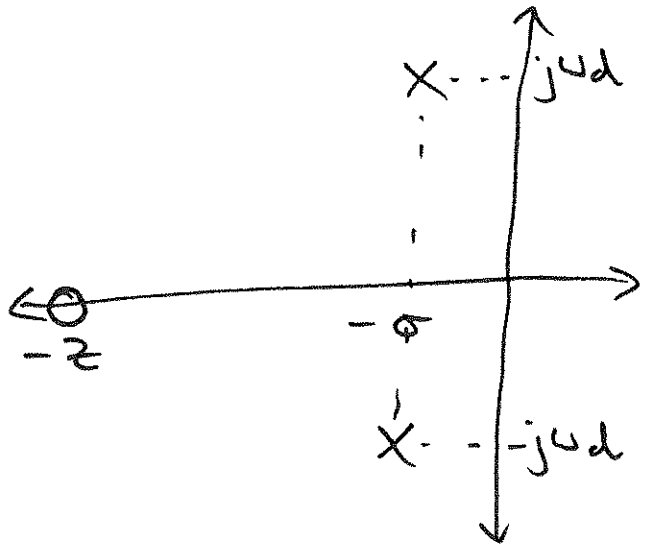
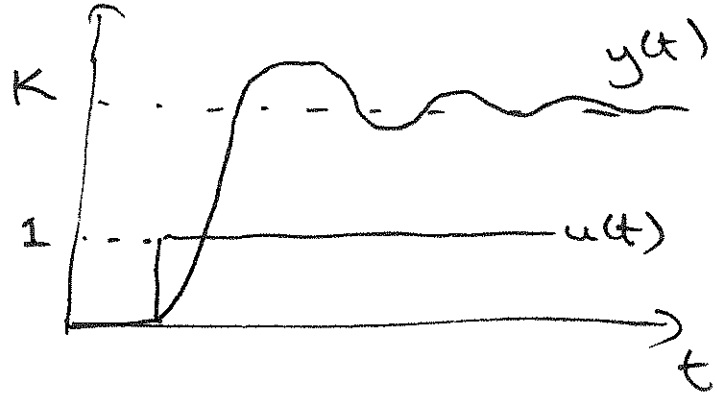
EFFECT OF ZERO ON TRANSIENT RESPONSE

POLE-ZERO PLOT

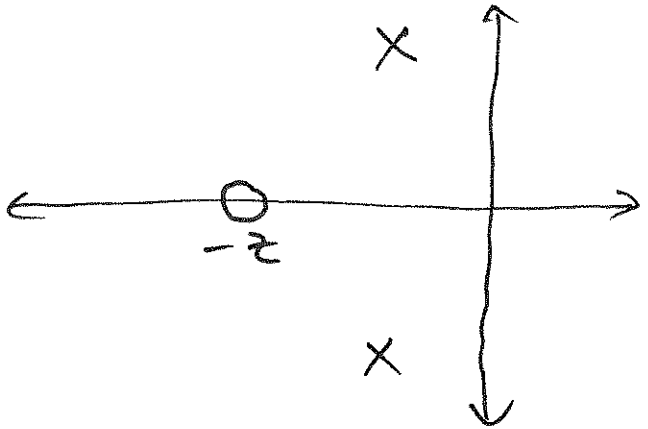
STEP RESPONSE

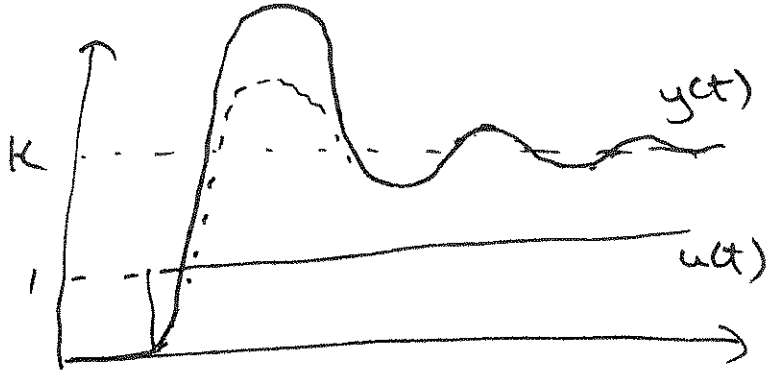






ZERO FAR AWAY, LITTLE EFFECT

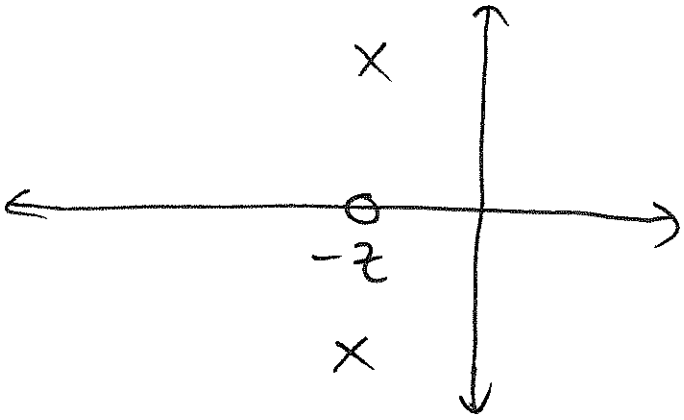


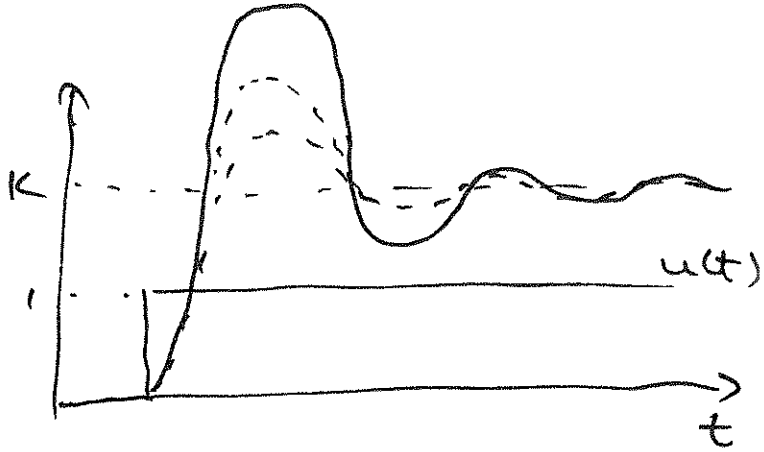


ZERO WITHIN FACTOR 4 OF REAL PART OF COMPLEX POLE PAIR

⇓

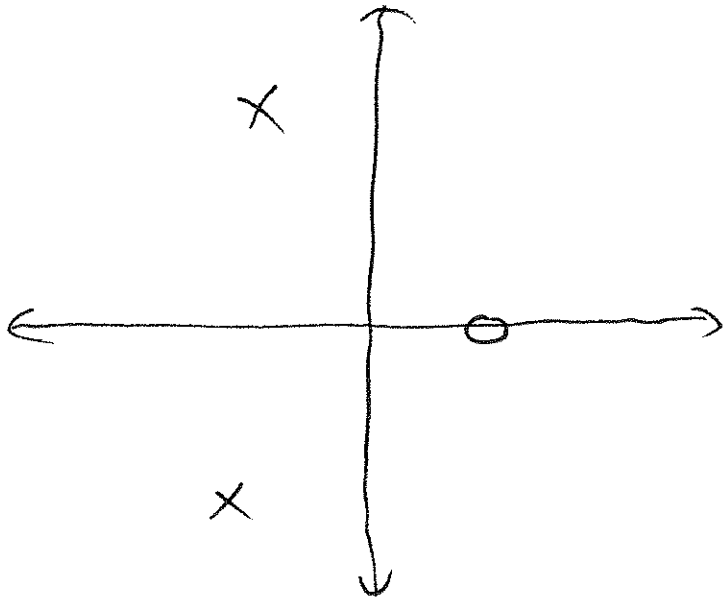
INCREASE OVERSHOOT

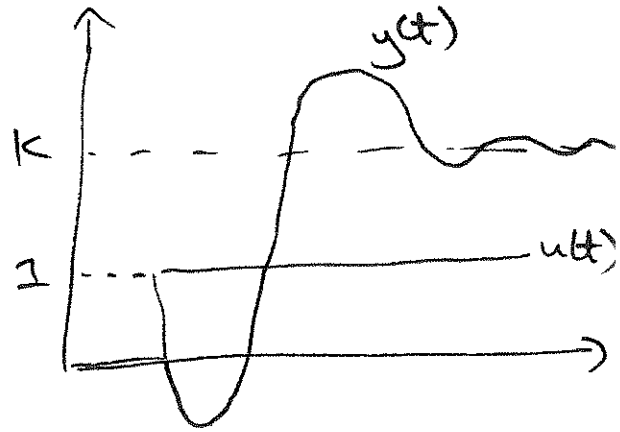




EFFECT OF ZERO IN RIGHT HALF-PLANE

(NON-MINIMUM PHASE ZERO)



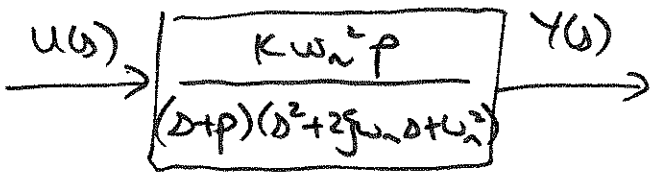


STEP RESPONSE STARTS IN THE OPPOSITE DIRECTION

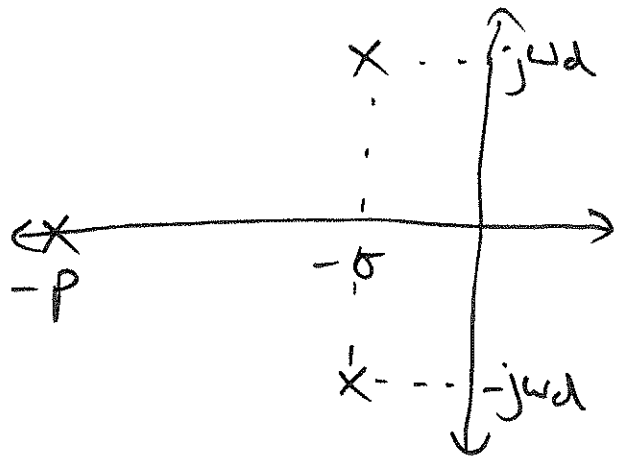
EFFECT OF ADDITIONAL POLE

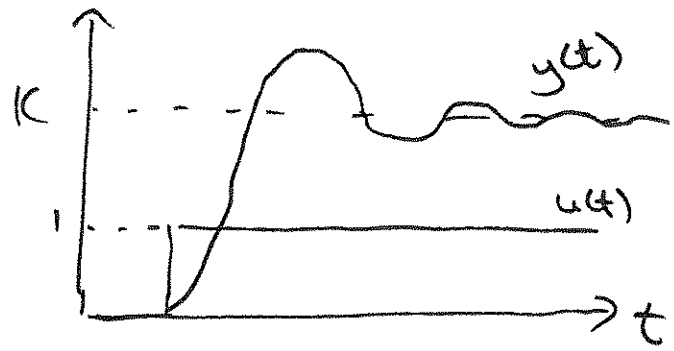
POLE-ZERO PLOT

STEP RESPONSE

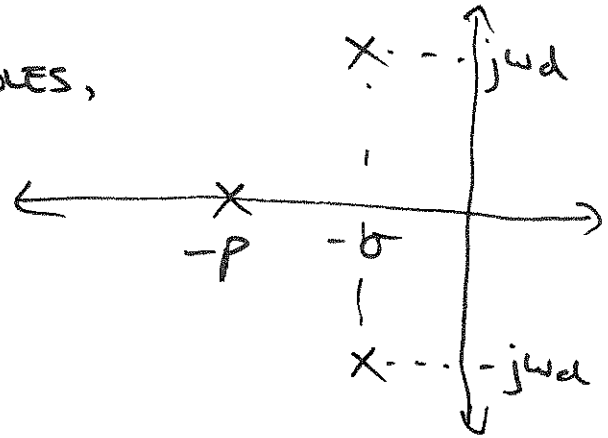


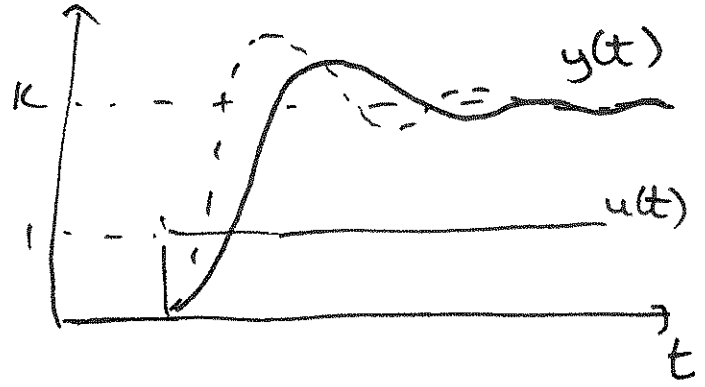
WHEN POLE FAR AWAY, LITTLE EFFECT





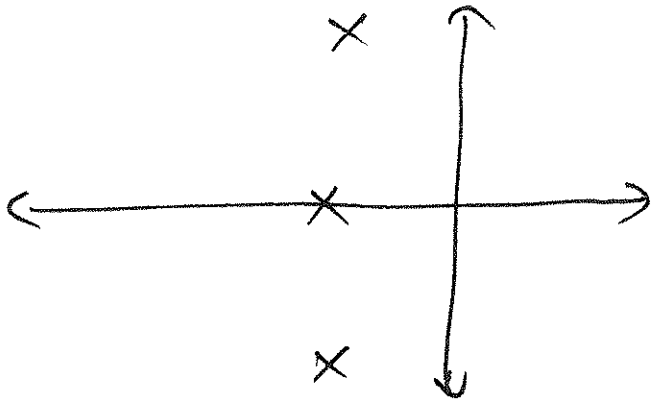
WHEN POLE WITHIN FACTOR 4 OF REAL PART OF COMPLEX POLES, RESPONSE CHANGES FROM DOMINANTLY SECOND ORDER TO DOMINANTLY FIRST ORDER

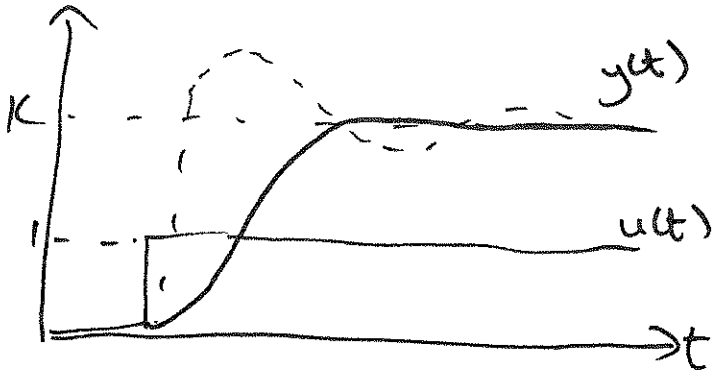




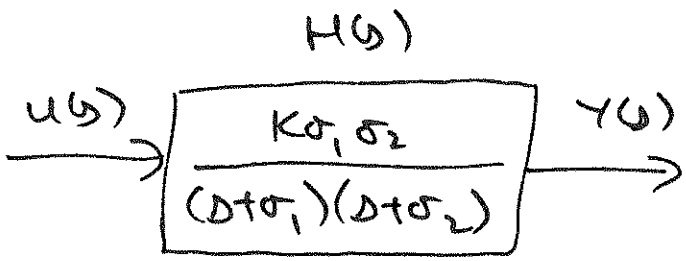
RISE TIME INCREASES

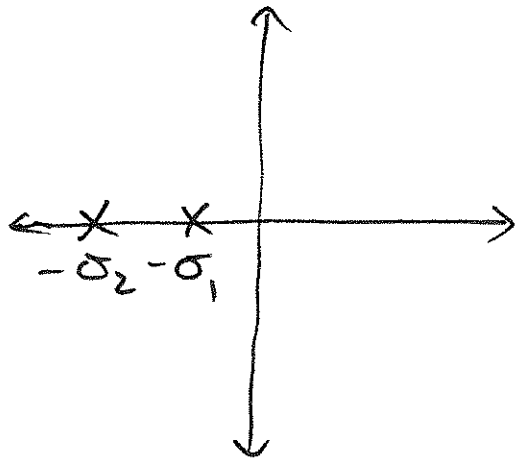
OVERSHOOT DECREASES

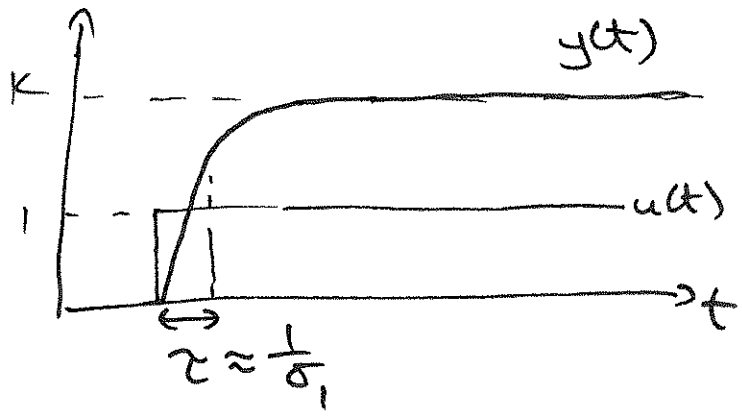


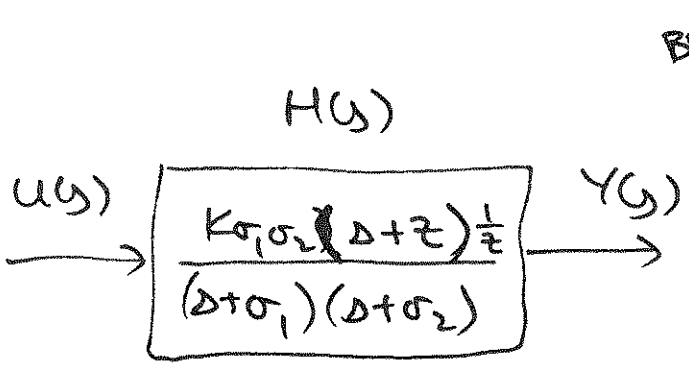


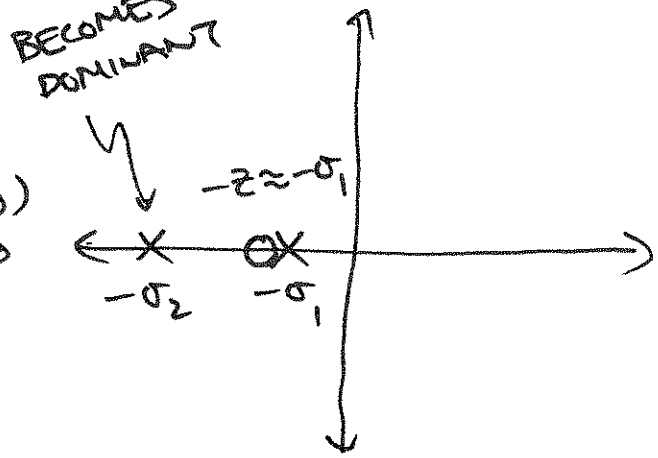
EFFECT OF ZEROS ON DOMINANT POLES

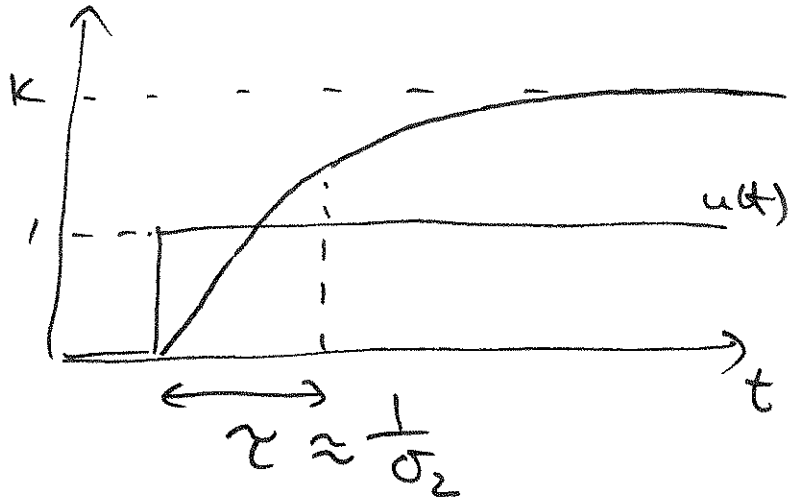












ZERO NEAR DOMINANT POLE REMOVES ITS DOMINANCE AND NEXT MOST DOMINANT POLE BECOMES DOMINANT

EFFECT OF ZEROS ON DOMINANT POLES