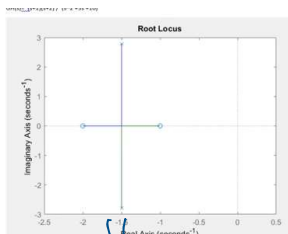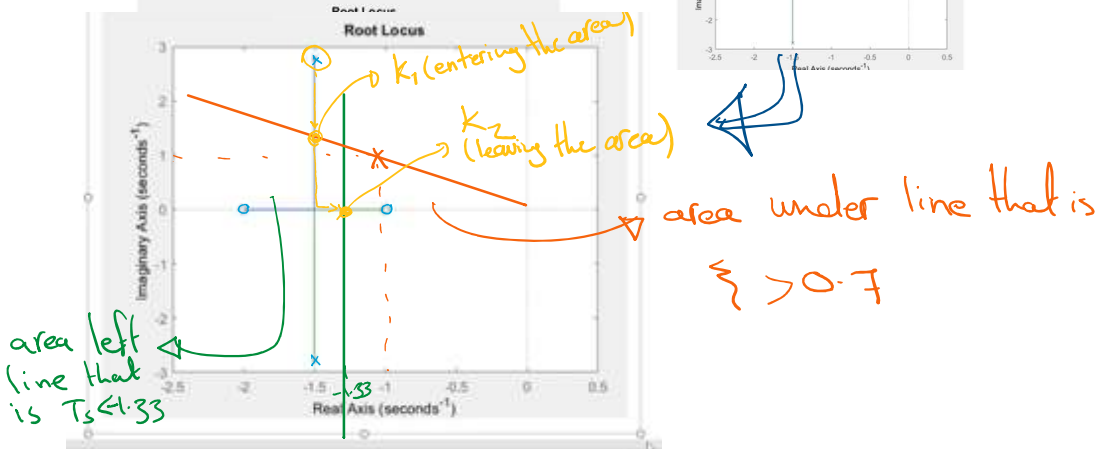# EXAMPLE-quiz

Monday, April 22, 2024   9:28 PM

For the following system determine K that achieves a damping ratio of > 0.7 and settling time < 2 s

GH(s)= (s+1)(s+2) / (s^2 +3s +10)

Root Locus

→ o k_1 (entering the area)

→ k_2 (leaving the area)

→ area under line that is
$\{ > 0.7$

area left line that is $T_s < 1.33$

① $\{ < 0.7$ so:

$$\tan(\cos^{-1}(0.7)) = 1.02$$

نعين النقطة على الربيعة و
نرسم خط بيقطعها من الصفر

② $T_s = \dfrac{4}{value} = \dfrac{4}{3} = 1.33$

نرسم خط عامودي
من نقطة -1.33

③ We begin with going through crosses and increasing as we go through them.

④ $k_1 < k < k_2$

entering   leaving

k_1 is at $s = -1.5 + 1.8j \Rightarrow GH(s) = \left| \dfrac{(s+1)(s+2)}{s^2 +3s +10} \right| = 0.7730$

at $s = -1.5 + 1.8j$

so $k_1 = \dfrac{1}{0.7730} = 1.292$

Control systems Page 1

So $k_1 = \dfrac{1}{0.7730} = 1.292$.

$= 0.0286$

at $s = -1.33$

k_2 is at $s = -1.33$ same thing   ''

$k_2 = \dfrac{1}{0.0286} = 34.97$

So $1.292 < k < 34.97$