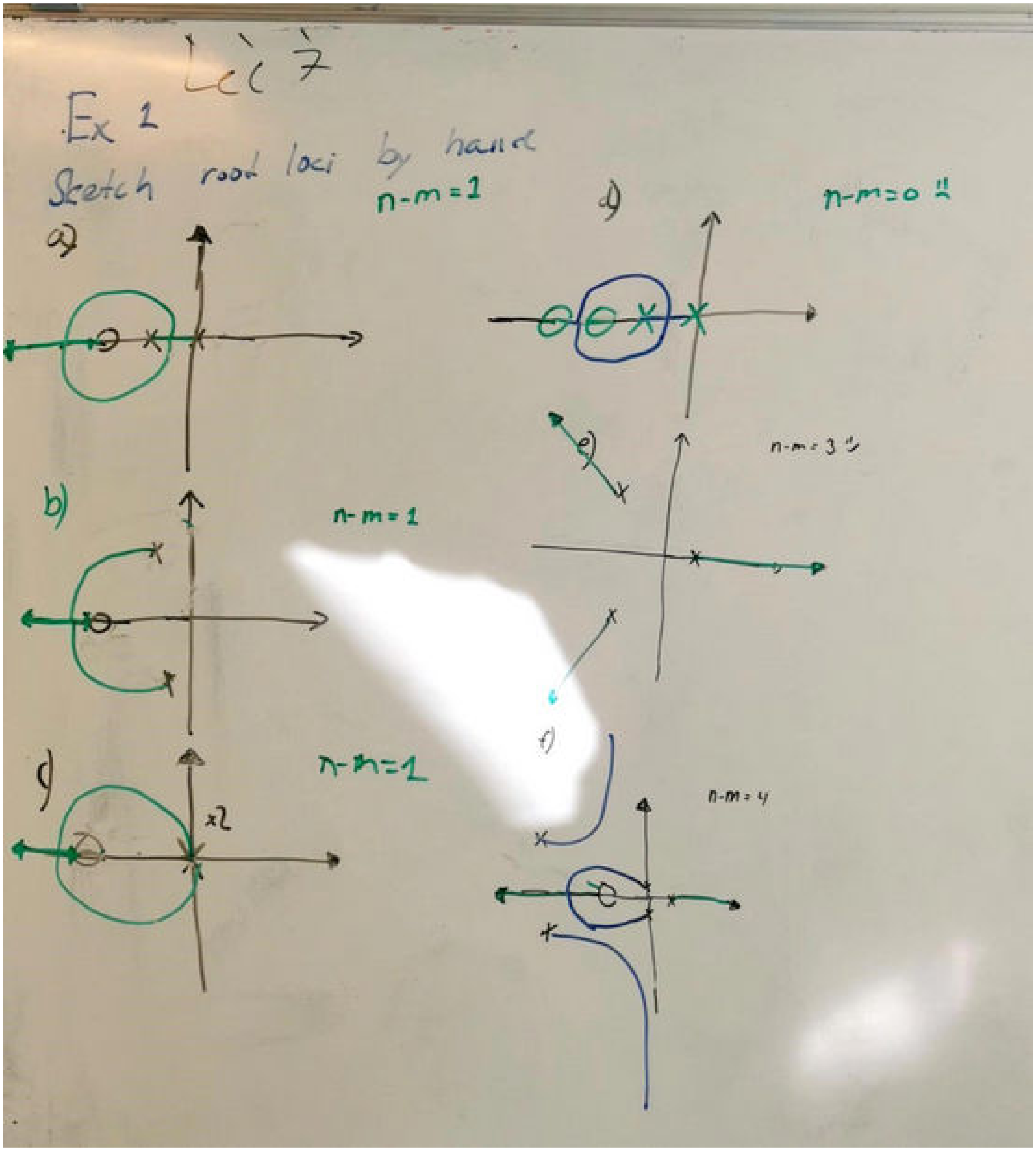
Ex 1

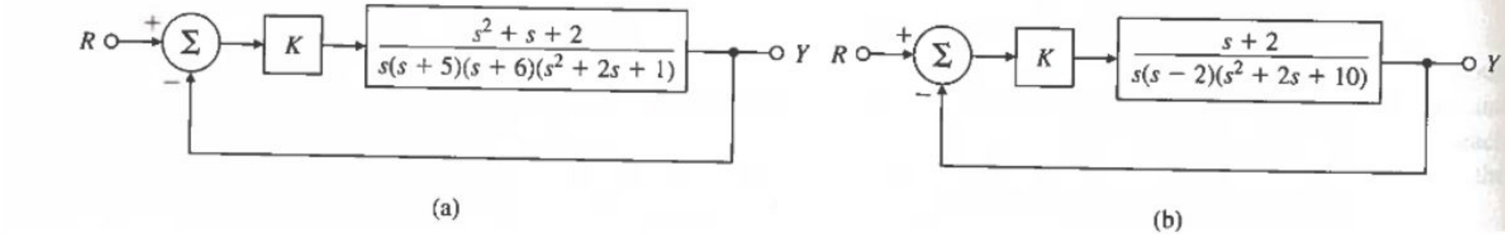


Konventionerne for rootlocus i hånden eller nærmere reglerne:

Se gennem gang på icloud for hvordan man tegner root locus.

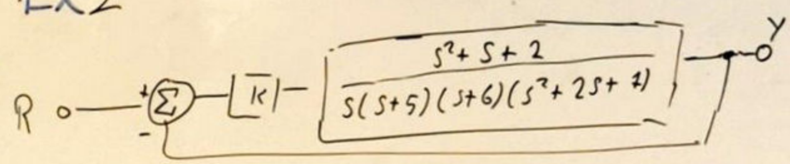
Ex 2

5.11 Use Routh's criterion to find the range of the gain K for which the systems in Fig. 5.53 are unstable, and use the root locus to confirm your calculations.



Lec 7

Ex 2



open loop: $1 + D(s)G(s)H(s)$

$D(s) = K$

$$T(s) = 1 + K\frac{s^2+s+2}{s(s+5)(s+6)(s^2+2s+1)}$$

Poly : $s^5 + 13s^4 + 53s^3 + (k+71)s^2 + (k+30)s + 2K$

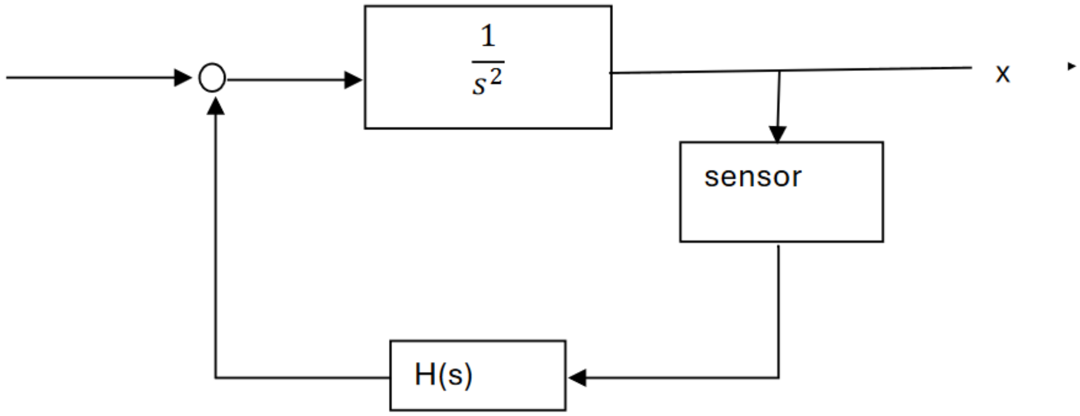
$$\begin{array}{c|cccc}
s^5 & 1 & 53 & k+30 & 0 \\
s^4 & 13 & (k+71) & 2k & 0 \\
s^3 & 618-k & 11k+319 & 0 & 0 \\
s^2 & c_1 & & & \\
s^1 & & & & \\
s^0 & & & &
\end{array}$$

$$b_1 = \frac{-(1\cdot(k+71) - 13\cdot 53)}{1} = 618 - K$$

$$b_2 = \frac{-((1\cdot 2k) - (13\cdot(k+30)))}{1} = 11k + 319$$

$$c_1 = -\left(\frac{(13\cdot(11k+319)) - ((618-k)\cdot(k+71))}{618-k}\right) = \frac{K^2 - 404k - 39731}{k-618}$$

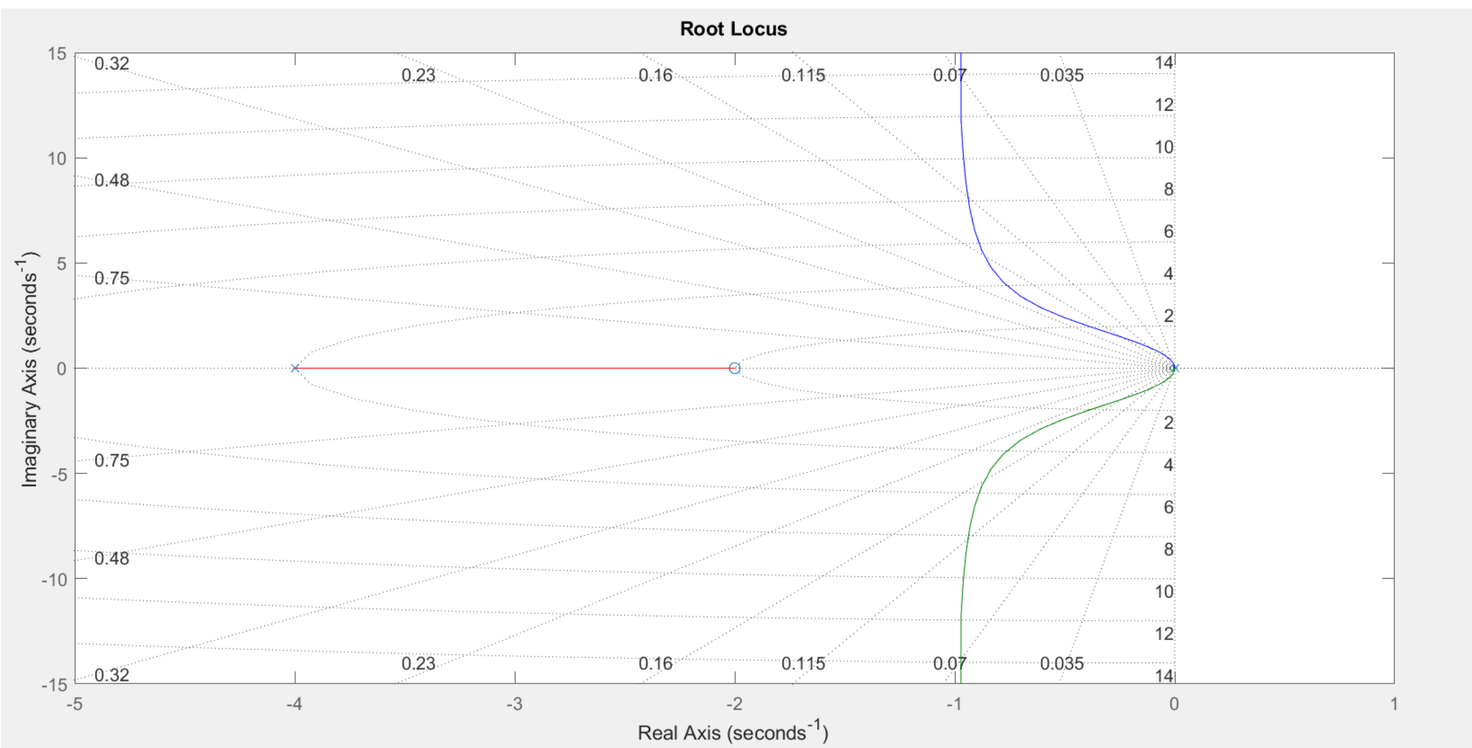
Ex 3



Show that if the sensor transferfunction =1, the lead compensator �(�) = $K\frac{s+2}{s+4}$ stabilizes the system

Use rootlocus and see that the system is stable.

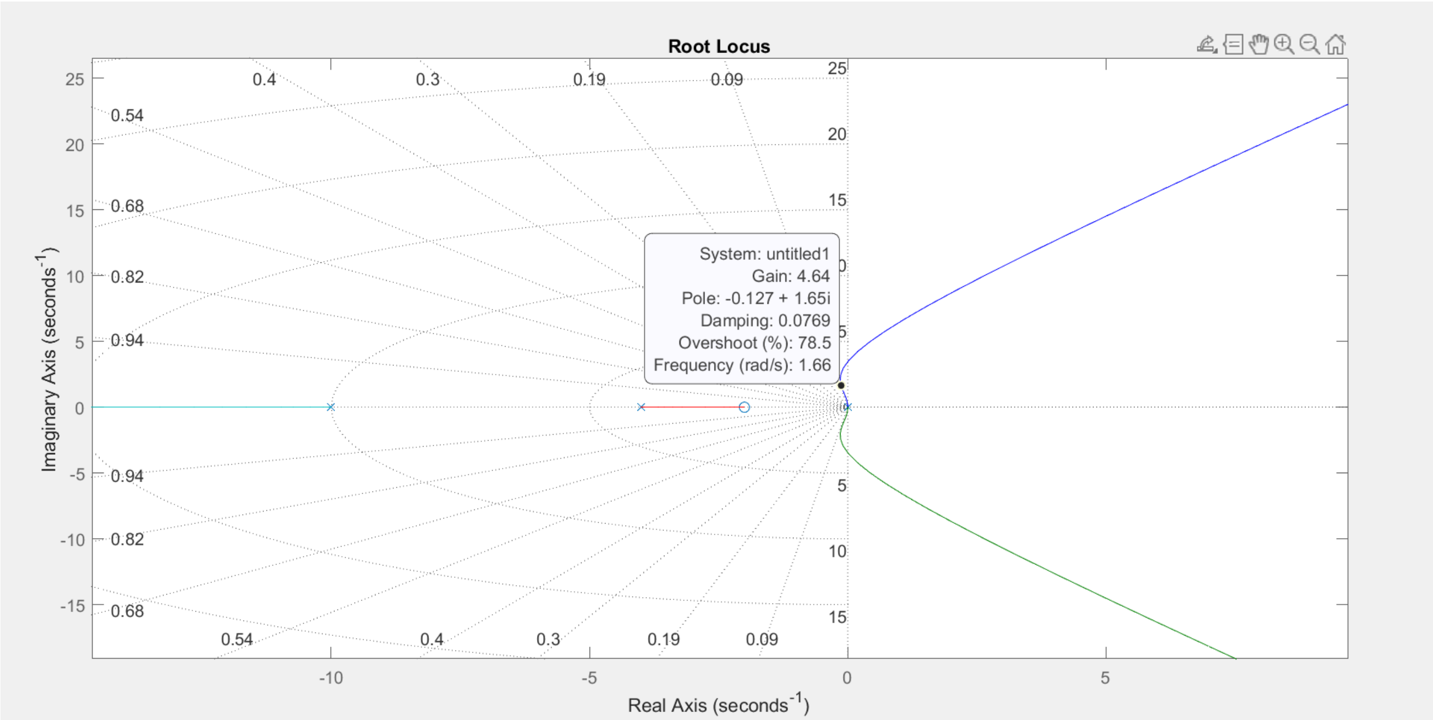
For $H(s) = K\frac{s+2}{s+4}$



Assume that the sensor =$\frac{1}{0.1s+1}$

Using the root locus, find a value for K that will give a maximum damping ration

For $H(s) = \frac{1}{0.1s + 1}$



Dette kan aflæses udfra rootlocus hvoraf den maksimale dampning kan findes ved en given K.

```
clear all
close
syms K
s = tf('s');
G = 1/s^2;
H = (s+2)/(s+4);
rlocus(G*H); %for 1 is stable since the root locus does not cross into the RHP of
the plot.
hold on
sen = 1/(0.1*s + 1);
% rlocus(sen*G*H);% for 2
sgrid
```