Opg 5,1

$$1+\frac{1}{s(s+c)}=0$$

sketch a root locus plot from 0-∞

$$1+\frac{1}{s(s+c)}=0$$

$$s^2+sc+1=0$$

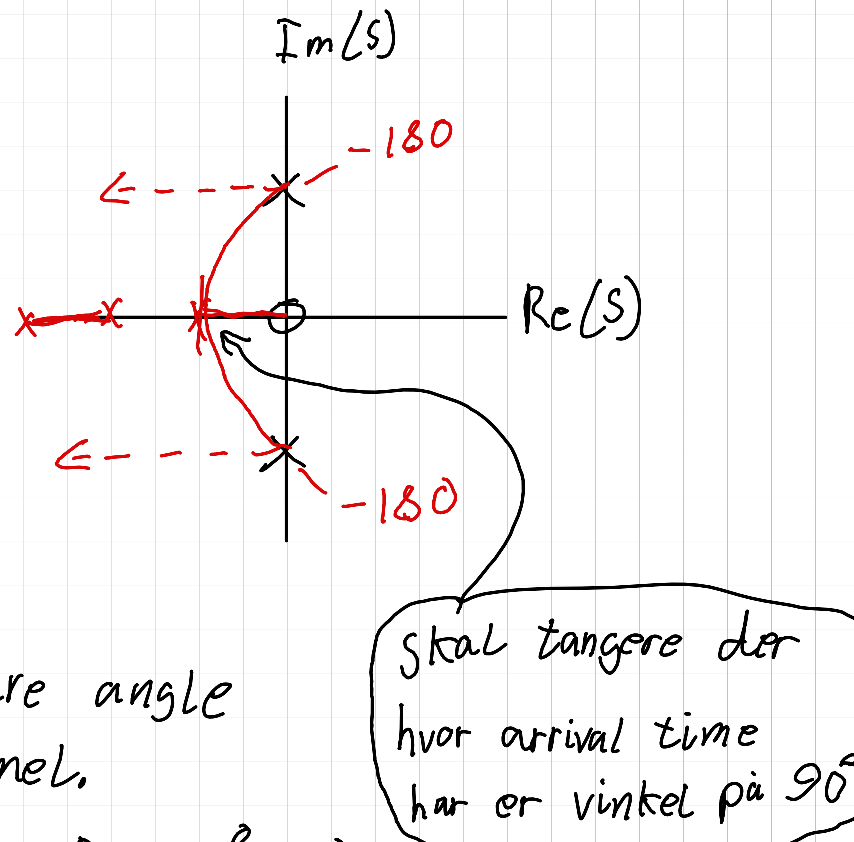
↖ k-term

$$1+c\cdot\frac{s}{s^2+1}=0$$

$m=1 \rightarrow 0$

$n=2 \rightarrow \pm j$

vi finder så departure angle med nedenstående formel.



$$\phi_{l,dep}=\frac{\sum \psi_i-\sum_{i\neq l}\phi_i-180^\circ-360^\circ(l-1)}{q}$$

$$\phi_{l_{s=j}}=\frac{-90^\circ-(-90^\circ)-180\cdot(1-1)}{1}=-180$$

$$\phi_{l_{s=j}}=\frac{90^\circ-90^\circ-180\cdot(1-1)}{1}=-180$$

opg 5,2

$$G(s) = \frac{1}{s^3 + 8s^2 + 32s}$$

controlled by a P-controller. Sketch a root Locus plot.

poler = 0 , $-4 \pm 4j$

vi bruger formlen for angle på asymptode

$$\phi_L = \frac{180^\circ + 360^\circ(L-1)}{n-m} \quad \text{hvor } L \text{ går fra } 1 \text{ til } q$$

$$\phi_1 = \frac{180}{3} = 60^\circ$$

$$\phi_2 = \frac{540}{3} = 180^\circ$$

$$\phi_3 = \frac{900}{3} = 300^\circ$$

vi finder så centroid of the asymptotes.

$$\frac{\sum_{i=1}^{n} p_i - \sum_{j=1}^{m} z_j}{n-m} =$$

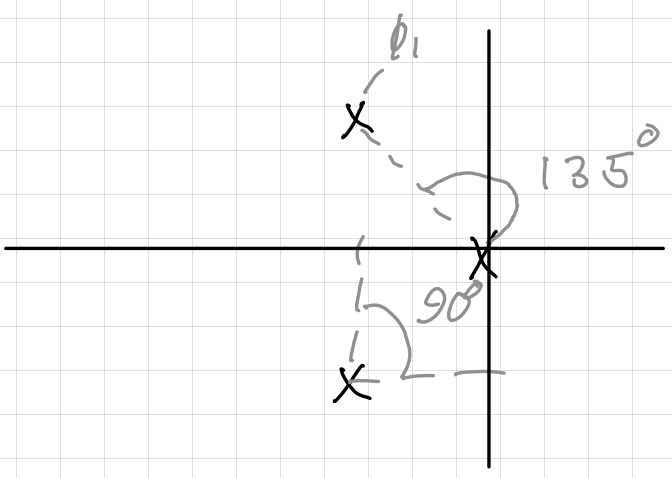
$$= \frac{0 - 4 + 4j - 4 - 4j}{3} = -\frac{8}{3}$$

vi regner så departure angles ud.

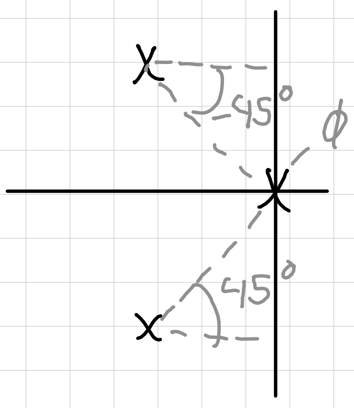
vi har ingen nulpunkter

$$\phi_{L,dep} = \frac{\cancel{\sum \psi_i} - \sum_{i \neq L} \phi_i - 180^\circ - 360^\circ(L-1)}{q} \quad \text{hvor } L \text{ går fra } 1 \text{ til } q$$

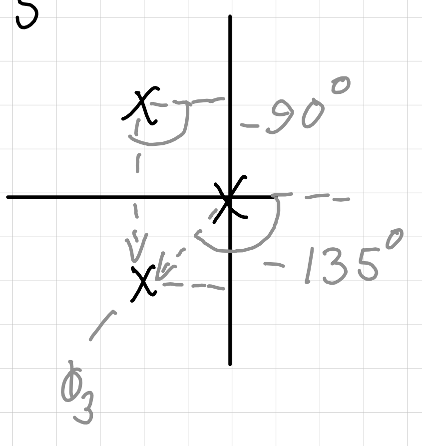
$$\phi_1 = \frac{-(135^\circ + 90^\circ) - 180 - 360(1-1)}{1} = -405 = -45$$



$$\phi_2 = \frac{-(-45 - 45) - 180 - 360(1-1)}{1} = -180$$



$$\phi_3 = \frac{-(-135 - 90) - 180 - 360(1-1)}{1} = 45^\circ$$



vi kan nu tegne vores root locus