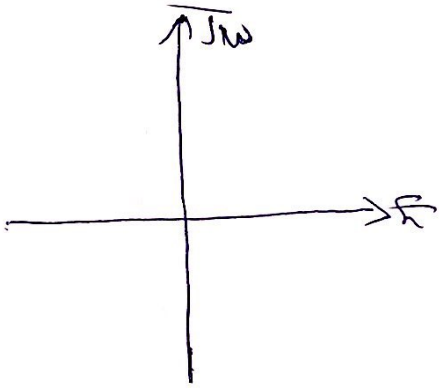
IMMAN USMAN SUMAA 17/ENG04/067
ELECT/ELECT

(1) Root locus is a graphical presentation of the closed loop poles as a system parametre is varied.
~~The~~ root locus gives a graphic presentation of a system stability.

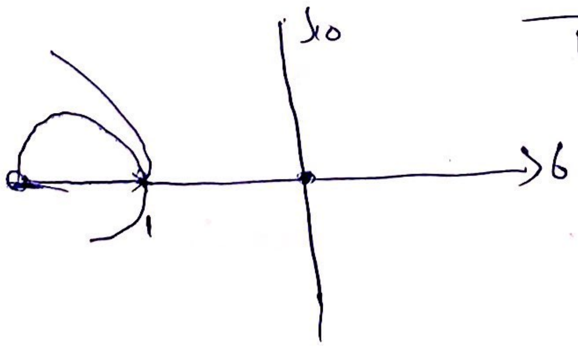
Under the Root locus there are various rules to ~~be~~ taken

(1) The root locus is always symmentrises about the axis

F.g



(2) The root locus always starts from the open loop poles & testiminates on either finite open loop zero & Infinity



The point maried x are the poles as a stated in Rule 2 it may terminate a r zero or intinity

(3) The number of branches terminative on infinity = P-Z

Where P → Number of Poles

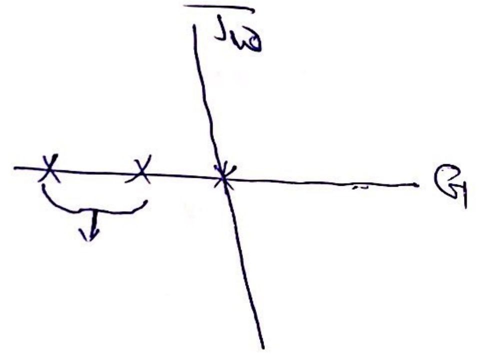
Z → Number of zero's

$$f.g = \frac{K}{s[\ \ ]} \quad Z = 0 \quad P = 2$$

No of branches 2-0 = 2.

(4) A point on the reae axis lies on the locus if number of open loue Poles + zero's on the rigur half of S Plan is odd.

f.g



That Part won't be added because it must be on odd number solts 3 Poles that is available these.

(5) The angle of asymptoles'

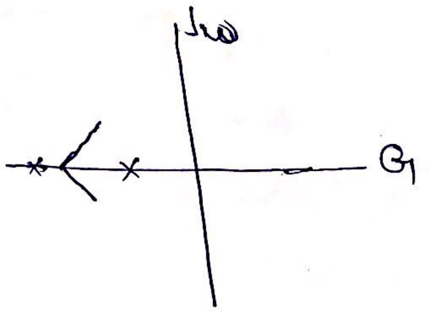
[illegible] (f P)Z $\phi_A = \frac{[2q+1]180°}{P-Z}$. q = 0,1,2 — P-Z-1

If Z > P $\phi = \frac{(2q+1)180}{Z-P}$ q = 0, 1, 2. — P-Z-1

(6) Centroid + The asymptotes meet the Reae axis at Centroid.

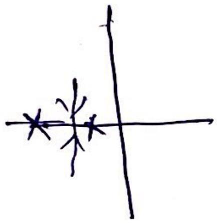
$$\text{Centroid} = \frac{\text{Sum of Reae Part of Poles} - \text{Some of Reae Parts of Zero's}}{\text{No of Poles} - \text{No of Zero's}}$$

E.g



7) Break away & Break in Point is calculated by solving $\frac{dk}{ds} = 0$

E.g



Breaking Point (Going into poles) Breaking away (Going away)

When ever you are hourm two poles you have break away but. When ever you have two Zero's you have breaking point.

8) The angle of decas ture from an open loop fs ~~Roots~~ Poles is given by $\phi_P = \pm 180°(2q+1) + \phi$ $q = 0, 1, 2 \ldots$

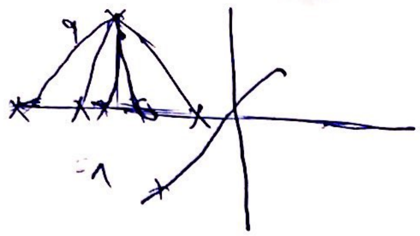
This means when you have imaginary poles.

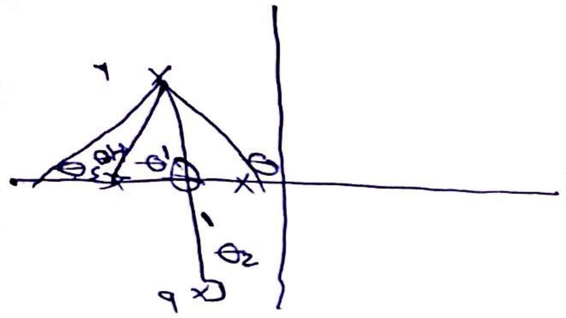
Wher $\phi = \theta_2 - (\theta_1 + \theta_3 + \theta_4)$

9) The angle of arrival from an open zero's given by $\phi_Z = \pm 180°(2q+1) - q$; $q = 0, 1, 2, 3$

When you have imaginary Zero's

The eq.: $\varphi = \theta = -[\theta_1 + \theta_3 + \theta_4]$ is given from.



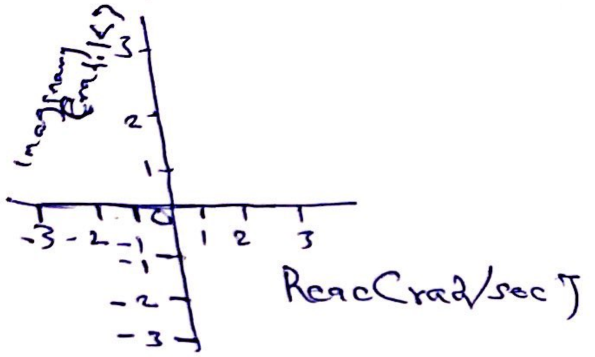


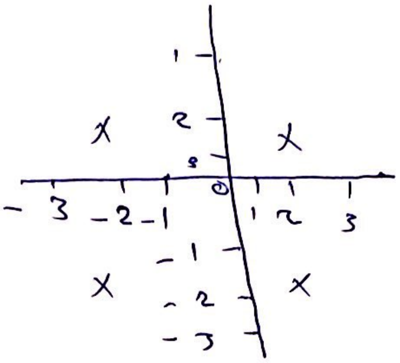
→ This is how to get ph. $[\varphi]$

(c) The Intersection of root locus branches & the Imaginary axis Canbe determined us of routh creteria,

The Intersection of the root locus on the Rere axis is called ENTRION but the Intersection point of the root locus on Imaginary axis is called the Intersection point.

(2) A whole row of zero's indicate the presence of pairs of poles ~~that~~ are mirrored about imaginary axis





→ At best the system is marginary stable
→ Use a Routh table to determine if its unstable.
→ If an entire row of zero's appears in a Routh table,

i) Creat an auxiliary polynomias form ~~of that~~ the row above the row of zero's other of S.

ii) Differentiat the auxiliary polynomias wirit s

iii) Replace the zero row ~~the~~ with the co-efficients of the resulting polynomials

iv) Complete the Routh table as usual.

v) Evaluate the ~~sing~~ sign of the first colum entires

(6) To determine the poles on the jw axis

Determine the system poles for the varies damage system the poles are

$= 0 \pm jw$