



force \rightarrow $\frac{1}{m s^2}$ \rightarrow position
rock = plant

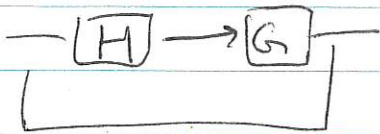
$$a = v \cdot t + c$$

$$\int v = \text{position}$$

$$\frac{1}{s} = L[S]$$

How to know if an ~~open~~ closed loop is stable,

$$\frac{1}{s^2} = \iint \ddot{x}(t) = x(t)$$



$$\frac{HG}{1 + HG}$$

① rewrite closed as ~~open~~

② solve roots

of "characteristic equation" (denom only) inator.

$$H(s) = \frac{N(s)}{D(s)}$$

s^6	A	B	C	D	E	F
s^5	B	D	F	H	J	
s^4						
s^3						
s^2						

BC-AD

3

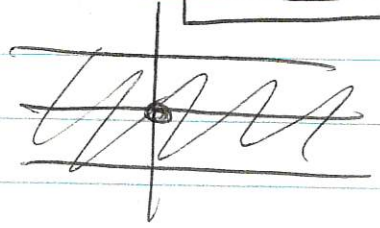
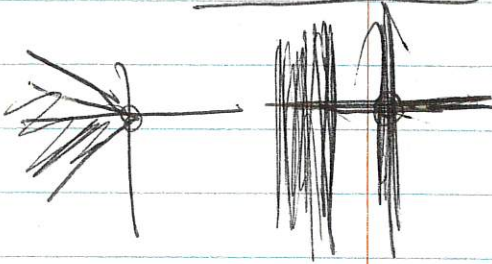
look for any sign of

change $\begin{matrix} +1 \\ +1 \\ -1 \end{matrix}$

b-2

$\phi = \text{origin}$

b-2



[Damping
ratio]

[Time to
decay
requirement]

[Natural
frequency]