

# CONTRACTS EXAMPLE

ROCKET FUTURE CONTRACT

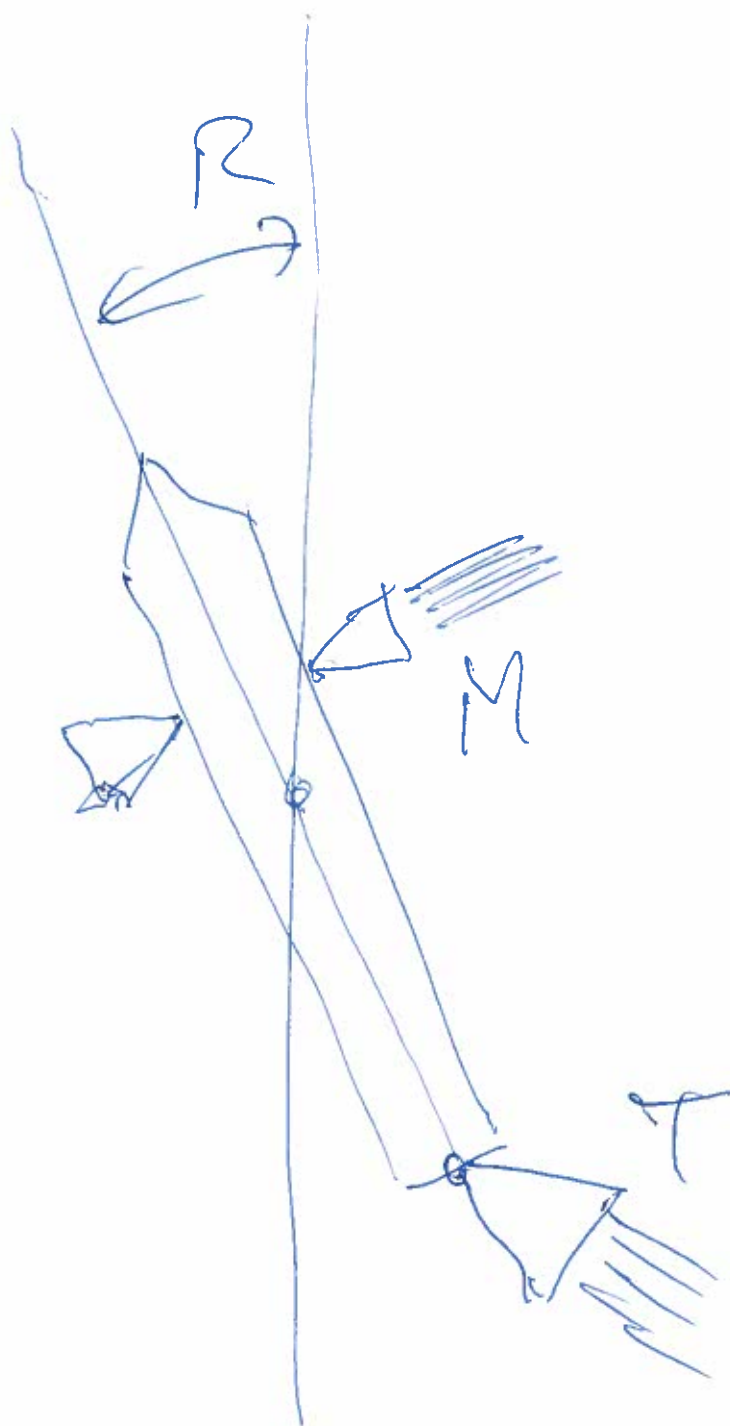
GROWING EDITIONS

$$\Delta \frac{\partial^2 P}{\partial t^2} - \frac{\partial P}{\partial t} = 1 + 0 - 1$$

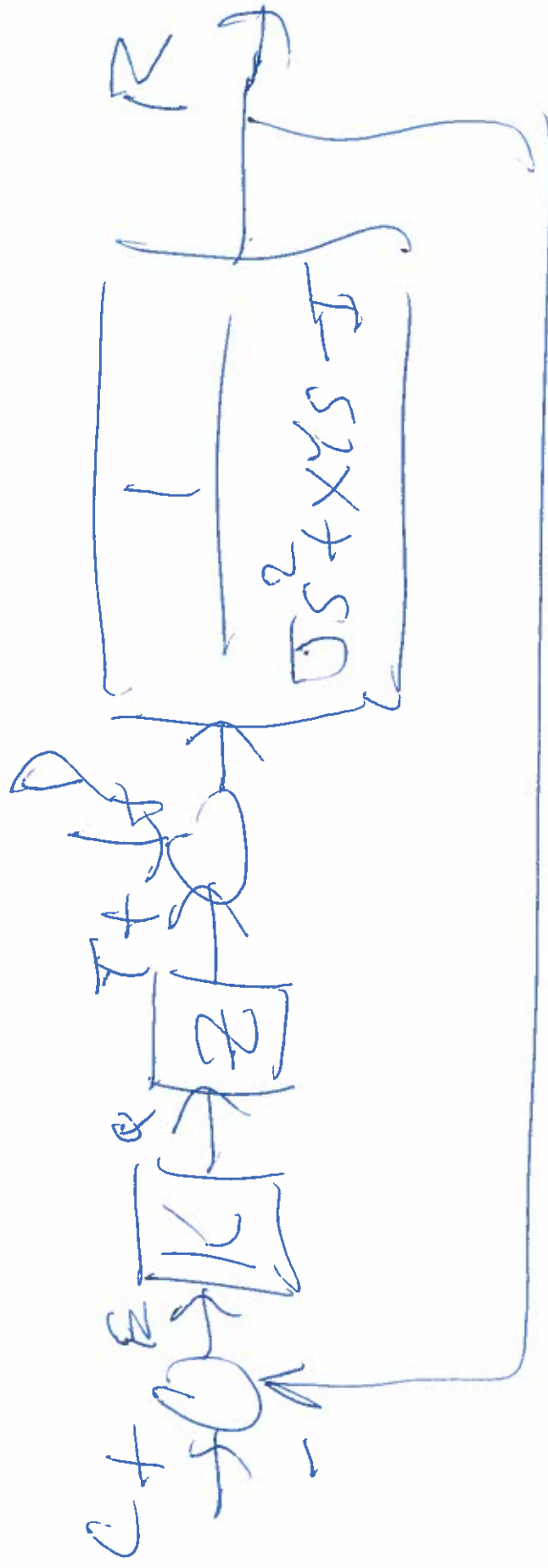
$$M = XN \quad N = Y \frac{dP}{dt}$$

$$T = ZQ \quad Q = KE$$

$$E = C - R$$



# Overdu Block Diagram



6th Function

$1/z$

$Ts^2 + Xs - 1$

# Characteristic Equation

$$s^2 + xs + 5 = 0$$

Zero Spring

$$k = \frac{1}{2} \quad c = 0$$

# PARAMETERS

$$T = 5000 \quad I = 50$$

$$X = 100 \quad Y = 7$$

$$Z = 100$$

$$K = 0.5 \quad \alpha = 0$$

Poles of GH

$$500s^2 + 700s + 500 = 0$$

$$500(s^2 + 0.14s - 0.01) = 0$$

$$500(s + 0.192)(s - 0.052) = 0$$

~~STABLE POLES~~  $-0.192$   
~~CN STABLE POLES~~  $+0.052$

NYQV15 Plot

$$K = 2 \text{ Hz}$$

$$A = \frac{Kz}{Ds^2 + xs - I}$$

$$\frac{1 \times 100}{s^2 + 500s + 50000}$$

IN ANSWER ~~51288~~

100

69

=

$$-5000\omega^2 + 200j\omega - 50$$

END POINTS

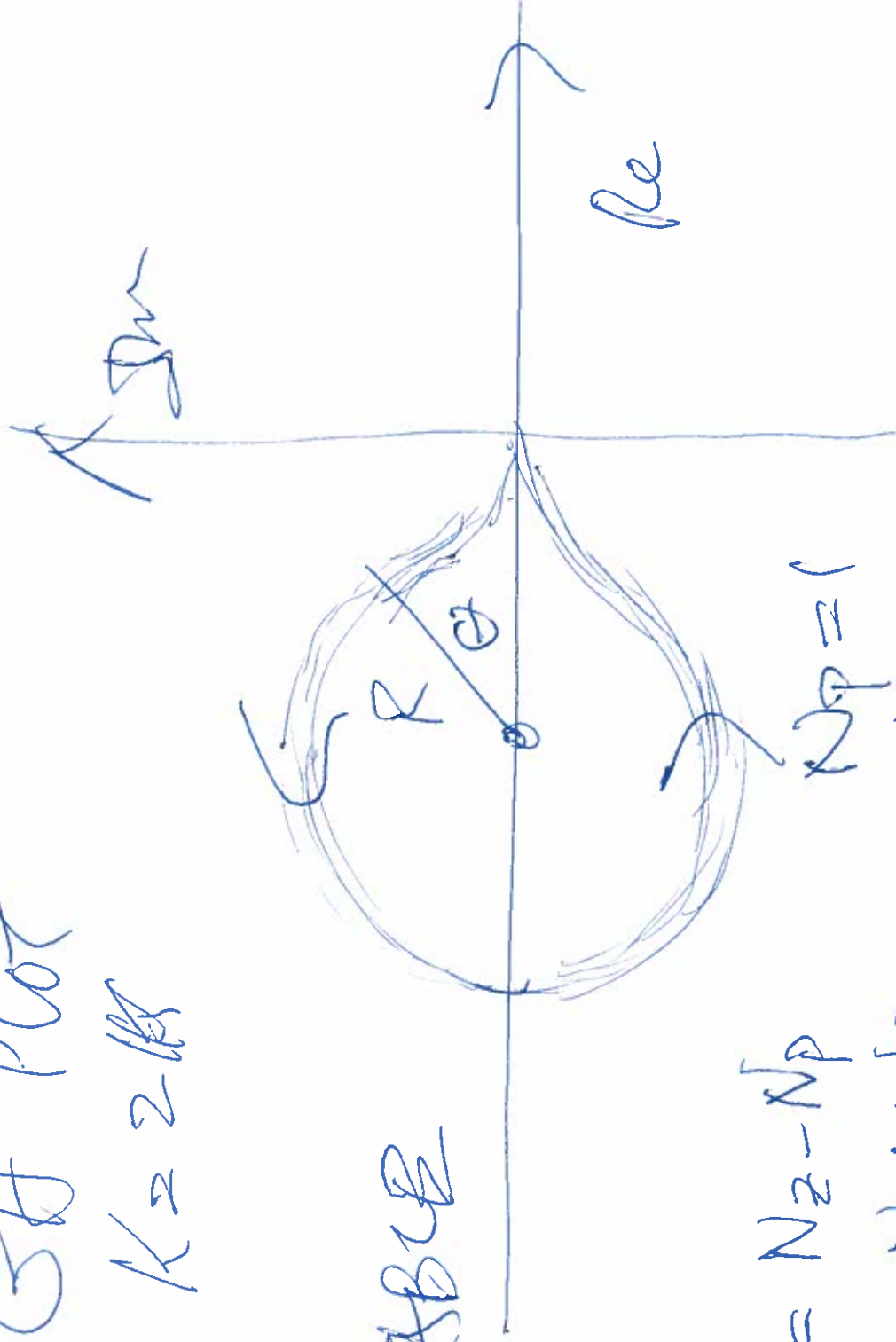
$$As \omega \rightarrow 0 \quad GH \rightarrow -2$$

$$As \omega \rightarrow \infty \quad GH \rightarrow 0$$

# GH Plot

$$K = 2 \times 10^4$$

STABLE



$$N = N_z - N_p$$

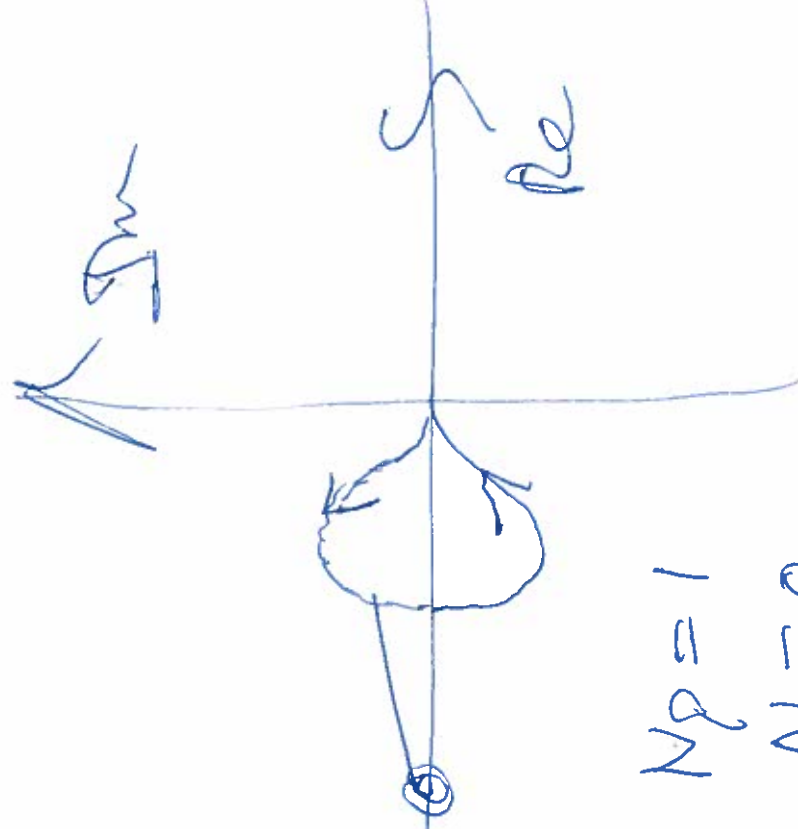
$$N_z = N + N_p$$

$$N_z = -1 + 1 = 0$$

GH Plot

$$K = 10/2$$

~~UNSTABLE~~



$$N = N_z - N_p \quad N_p = 1$$

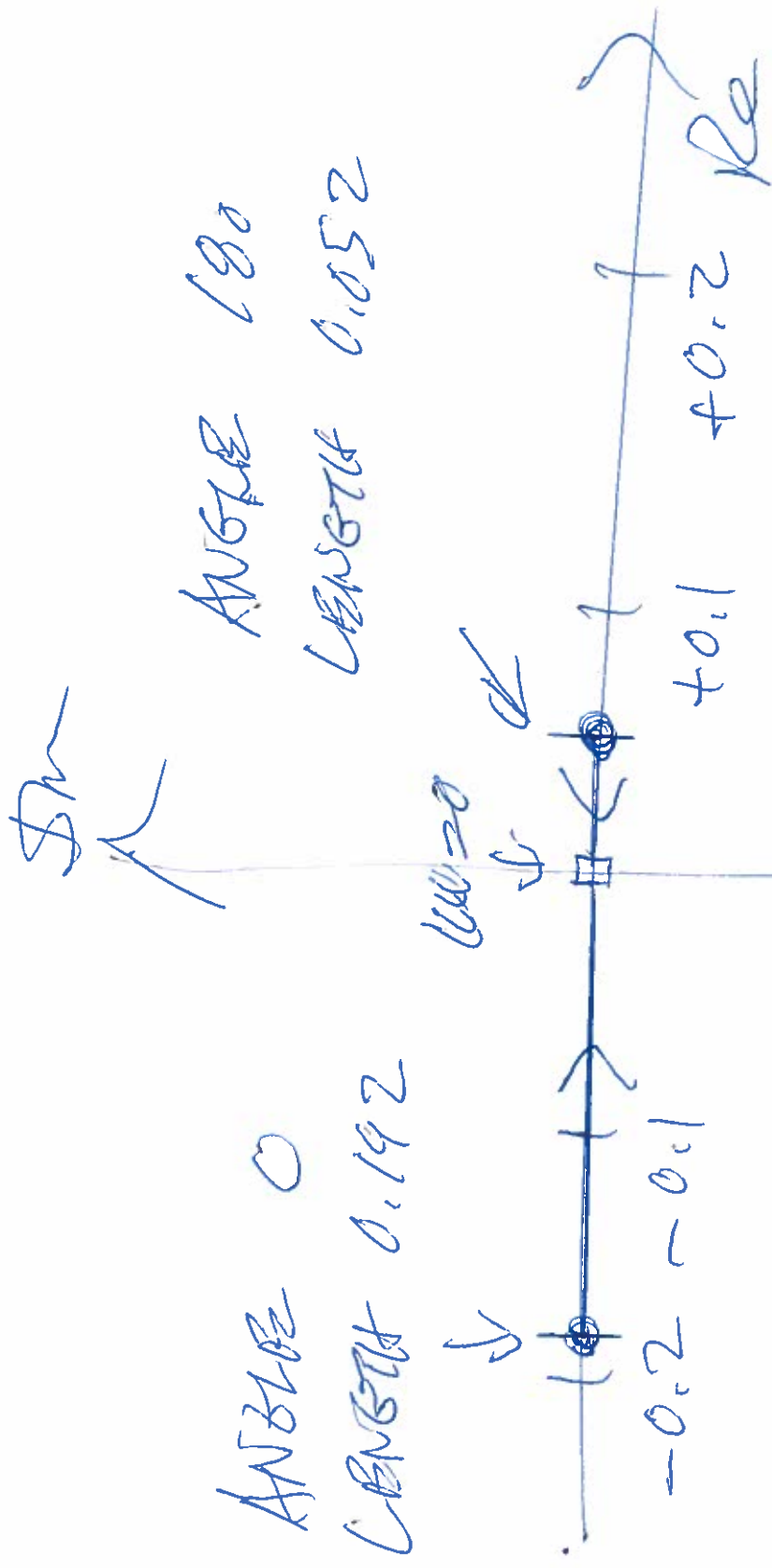
$$N_z = N + N_p \quad N = 0$$

$$N_z = 0 + 1 = 1$$

$$\frac{(250'0-5)(261'0+5)0003}{\text{100} \cancel{\$}} =$$

$$\frac{05-5002+250003}{\text{100} \cancel{\$}} = 19$$

$$2007 \text{ locus ethrek}$$



ANGLES  $0 + 180 = 180$  ✓

5420137

$$\frac{100}{100} = 1$$

$$500 \times 0.192 \times 0.052$$

$$\frac{500 \times 0.192 \times 0.052}{100}$$

$$\frac{50}{100} = 0.5 \checkmark$$

Roller AFTER COPE CONTROL

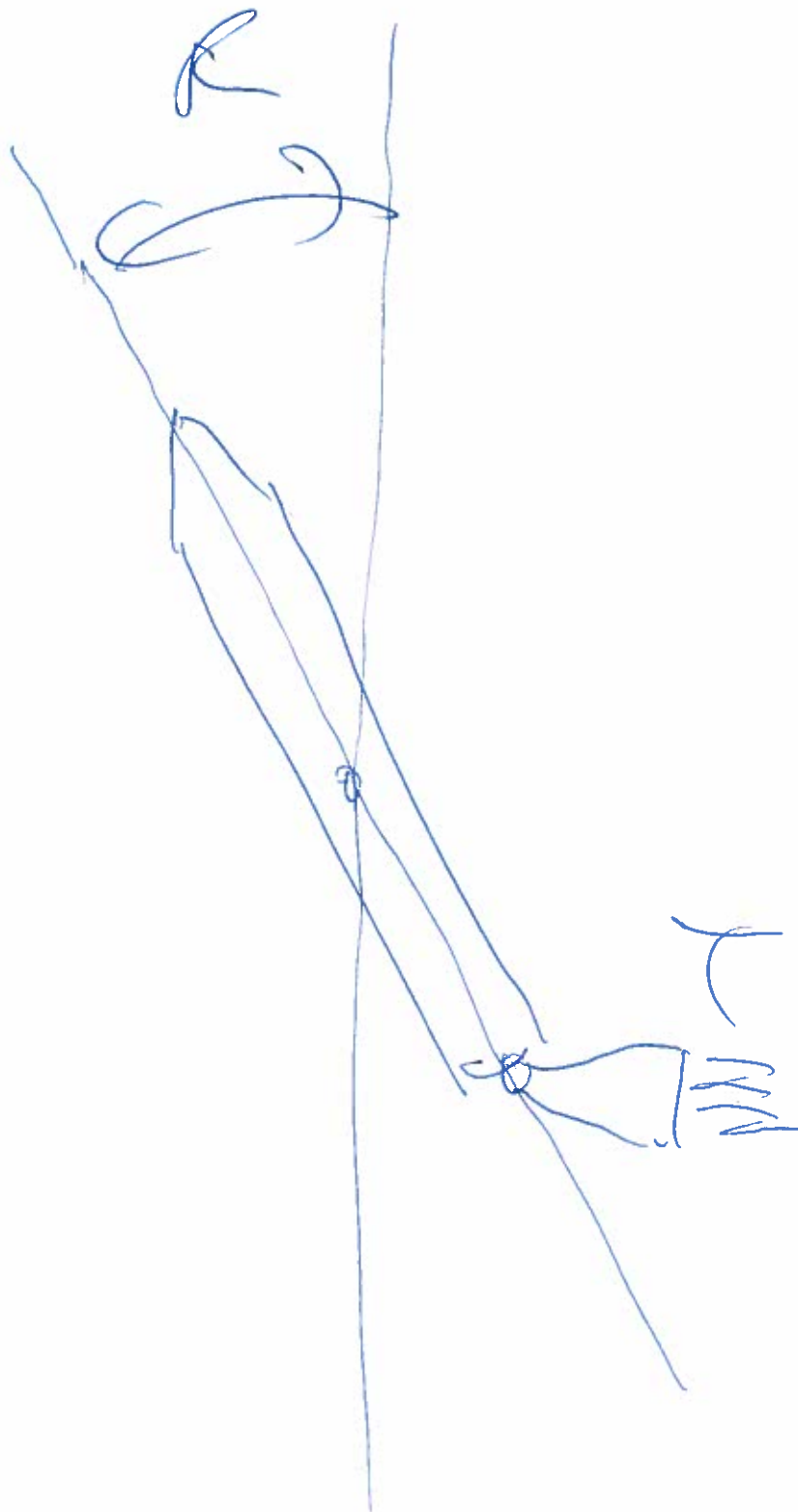
Governing Equations

$$T \frac{d^2 p}{dt^2} - TR = T + D$$

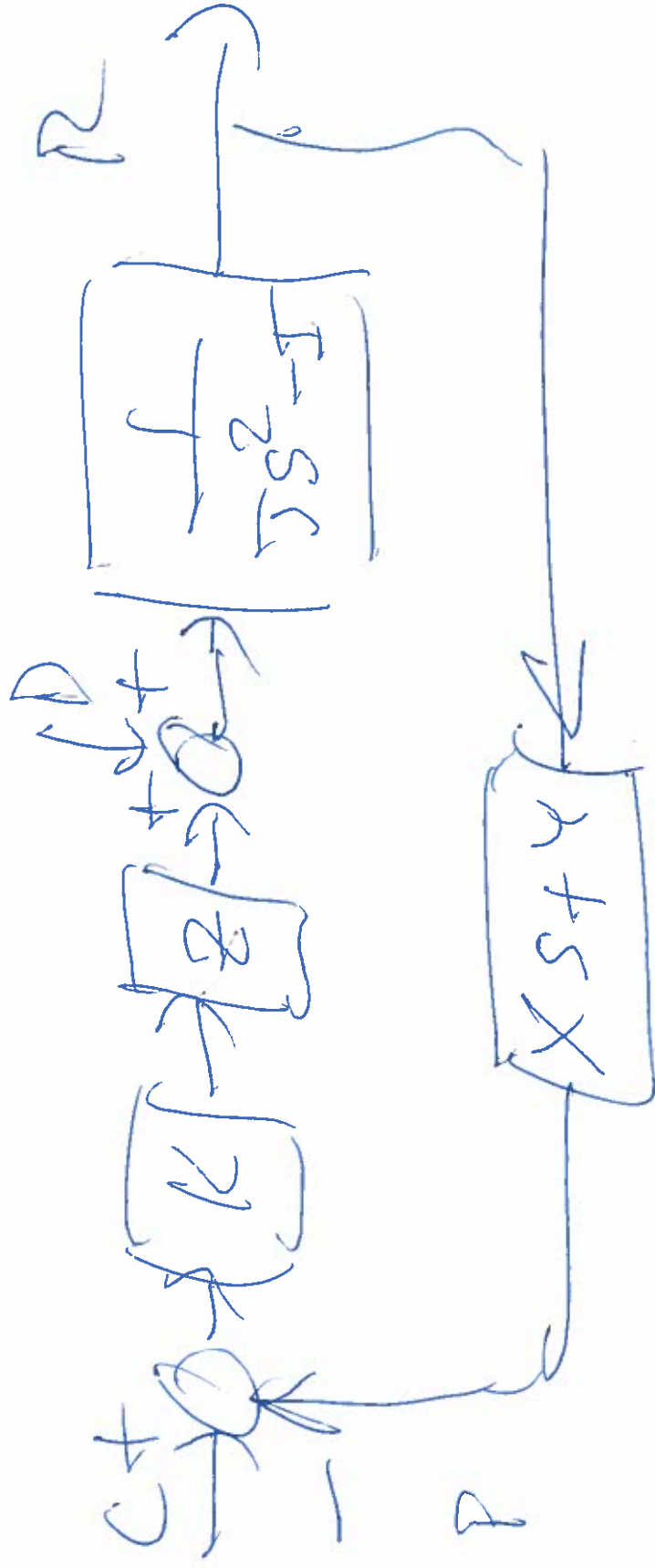
$$T = 20 \quad D = KE$$

$$E = C - P$$

$$P = X \times \frac{dP}{dt} + YR$$



Overdu Block Diagram



GH FUNCTION

$$\frac{KZ(XS+Y)}{(TS^2-T)}$$

CHARACTERISTICS RECORD

55-1274 5 X 274 50

$$H = \frac{I}{Z} \quad 0.80$$

ZERO SPRING

# PARAMETERS

$$J=10 \quad I=40$$

$$X=1 \quad Y=1$$

$$Z=10$$

$$K = \frac{40}{10 \times 1}$$

$$= 4$$

GH Plot

$$K = 2$$

$$(1 + sX) ZY$$

$$(5 - 2s)$$

$$GH =$$

$$(1 + s) 0.1 \neq B$$

$$10s^2 - 40$$

Poles of GH

$$10s^2 - 40 = 0$$

$$10(s+2)(s-2) = 0$$

STABLE POLE  $-2$

UNSTABLE POLE  $+2$

TRANSMITTED

$$G_H = \frac{8\sigma(j\omega + 1)}{-10\omega^2 - 40}$$

$$\text{As } \omega \rightarrow 0 \quad G_H \rightarrow -2$$

$$\text{As } \omega \rightarrow \infty \quad G_H \rightarrow -0j$$

GH Plot

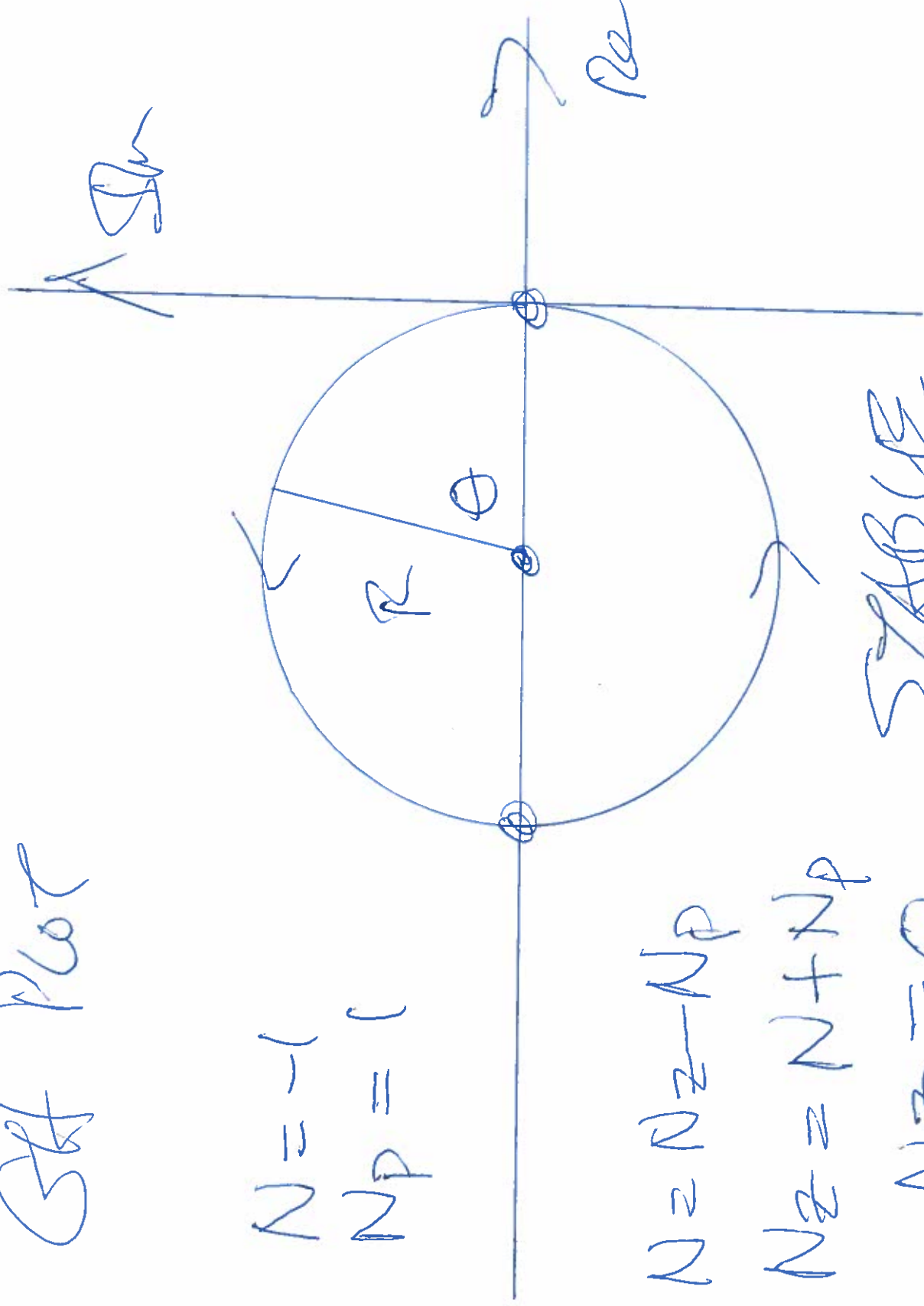
$$N = -1$$

$$N_P = 1$$

$$N = N_Z - N_P$$

$$N_Z = N + N_P$$

$$N_Z = 0$$



STABLE

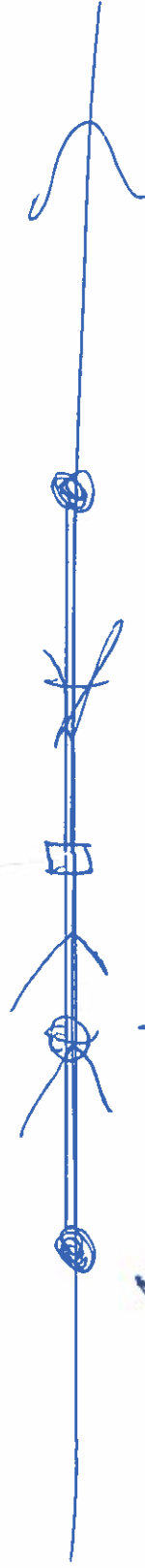
Root locus after

$$GH = \frac{(s+4)}{(s^2-5s)}$$

$$= \frac{(s+5)}{(s+10)}$$

ANSWER  $\Rightarrow 0 - 0 - 180 \Rightarrow -180^\circ$  ✓

✓ SR



ANSWER 0  
LENGTH 2  
POLE ZERO

ANSWER 180  
LENGTH 2  
POLE

LBK 5

$$\frac{10 \star 2 \star 2}{10 \star 2 \star 2} = 1$$

$$10 \star 2 \star 2 = 4 \checkmark$$