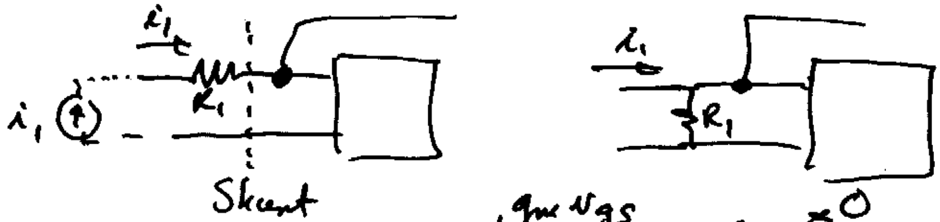
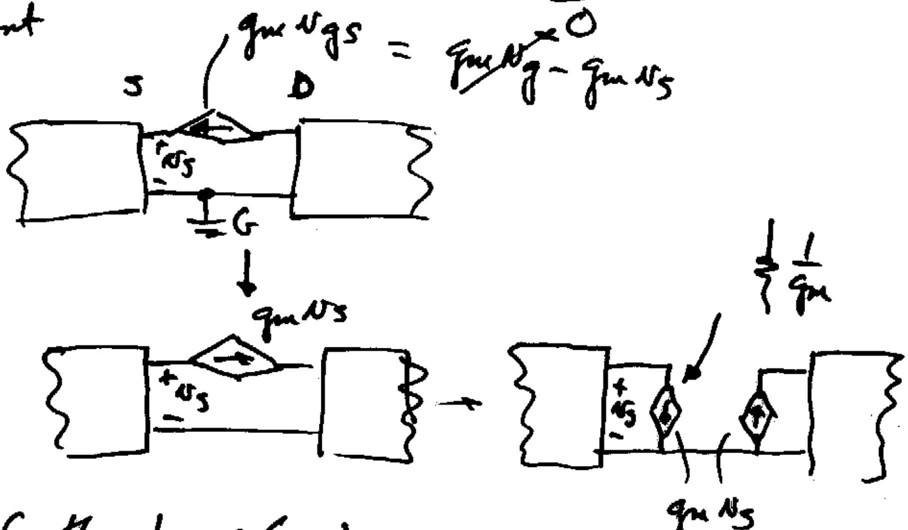
Comments on Quiz #12

1.) The units of A change with the 4 fb. topologies.

2.) Current driven



3.)

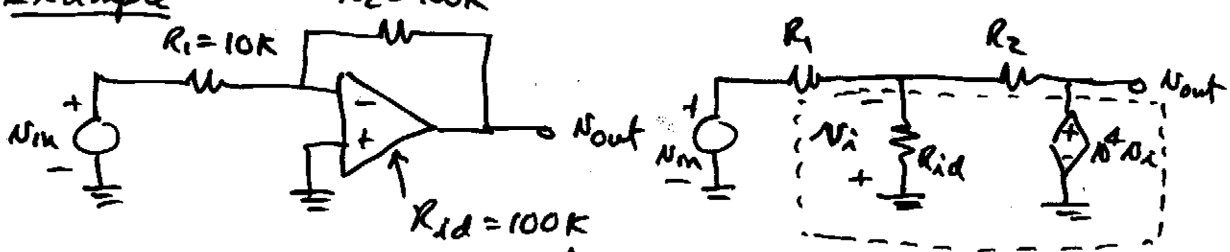


Calculation of the Loop Gain –

1.) Direct

2.) Successive voltage and current xxx

Example

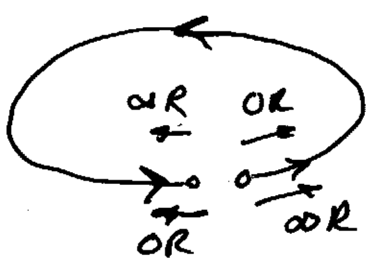


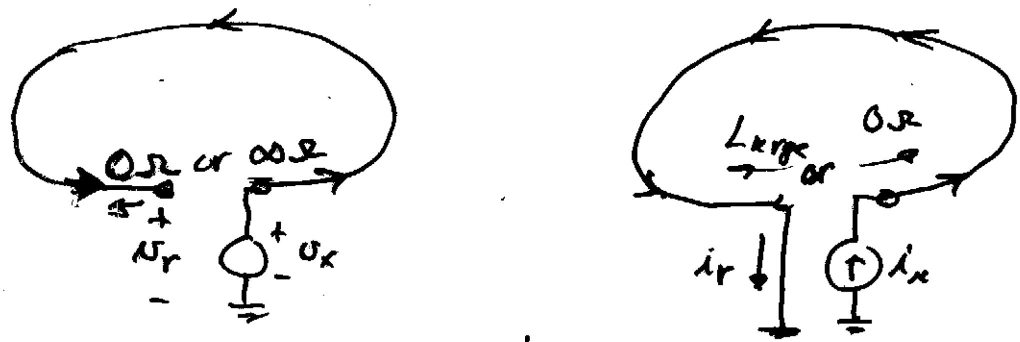
$R_{id} = 100K$

$A_{vd} = 10^4$

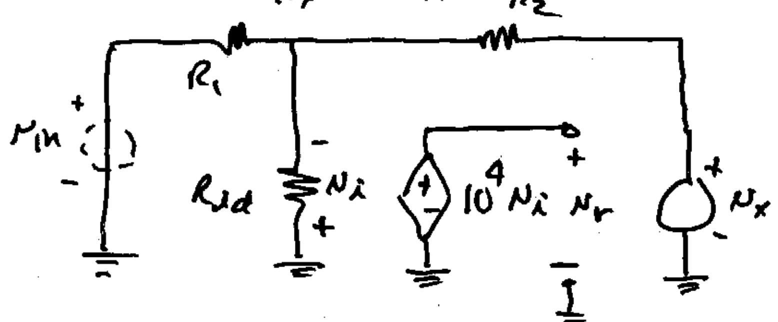
$R_o = 0$

When you apply the direct method look for points of ∞ resistance or 0 resistance.





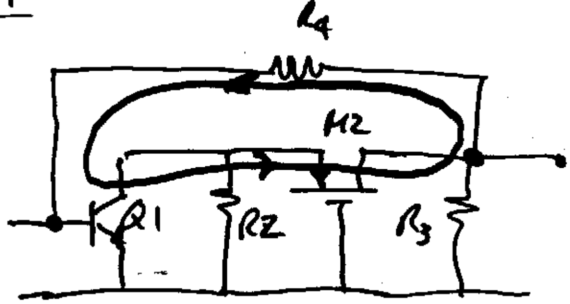
$$T = -\frac{v_r}{v_x} = \frac{-i_r}{i_x}$$

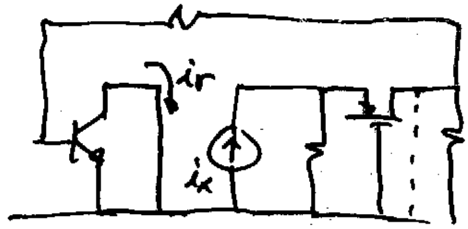


$$v_r = 10^4 v_i = 10^4\left(\frac{-R_1\|R_{id}}{R_1\|R_{id} + R_2}\right)v_x$$

$$\therefore\ T = -\frac{v_r}{v_x} = \left(\frac{10^4(R_1\|R_{id})}{R_1\|R_{id} + R_2}\right) = \frac{10^4 \cdot 9.09k}{(9.09+100)k} = \underline{\underline{83.33}}$$

Quiz 12





Stability of Feedback Amplifiers

$$A_F = \frac{A}{1+AB} \longrightarrow A_F(s) = \frac{A(s)}{1+A(s)B(s)} = \frac{A(s)}{1+T(s)} \quad \left(\frac{A(s)}{1-T(s)}\right)$$

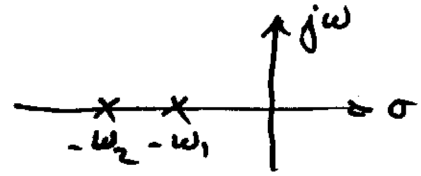
Roots of denominators (poles) must be in the LHP.

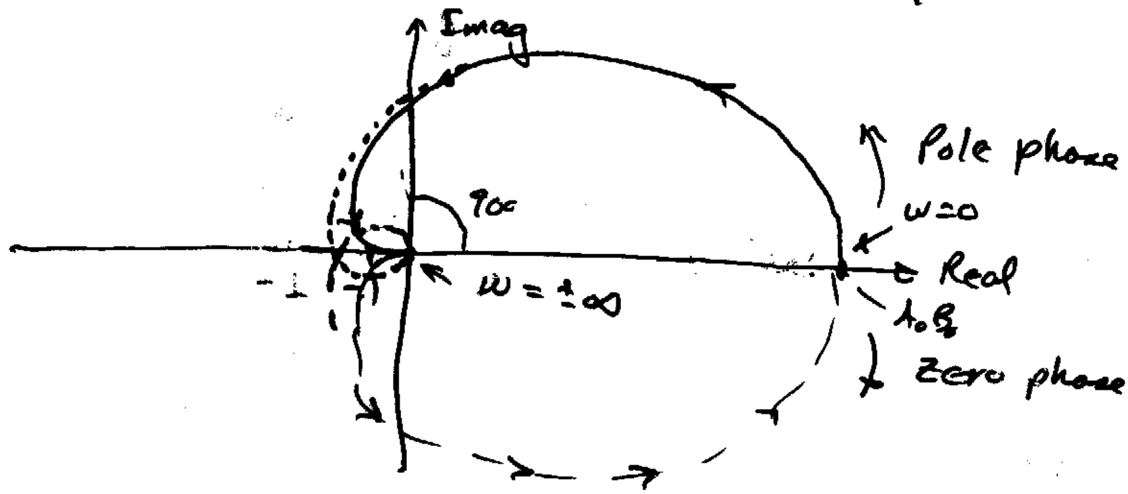
Two approaches to determining stability

1.) Nyquist plot

Plot $T(j\omega)$ on a complex plane for values of ω varying from 0 to $+\infty$, $-\infty$ to 0. If this plot encloses the -1, the amplifier is unstable.

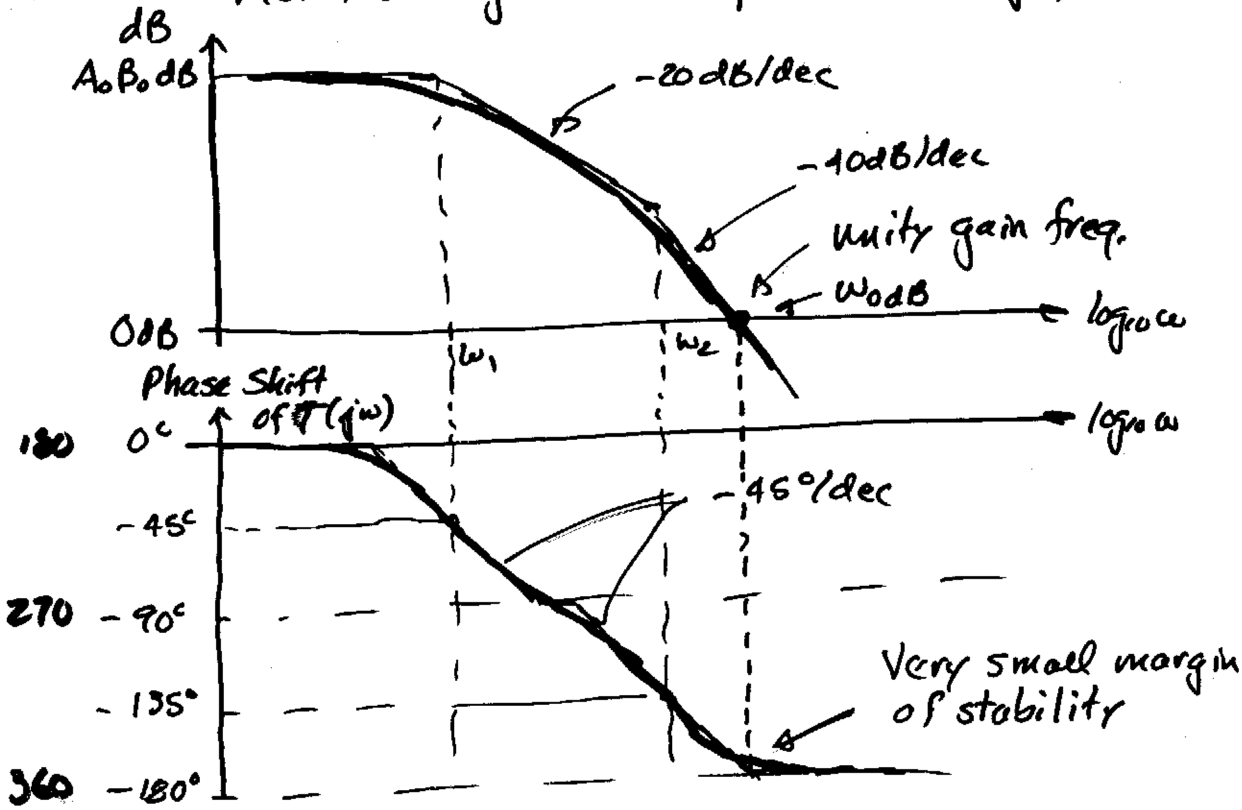
$$T(s) = A(s)B = \frac{A_0 B_0}{\left(\frac{s}{\omega_1}+1\right)\left(\frac{s}{\omega_2}+1\right)}$$





2.) Bode Plots

Plot the magnitude and phase of $T(j\omega)$



A feedback amplifier is stable iff -

a.) $\text{Arg}[T(j\omega_{0dB})] > -180°$ $\quad \omega_{-180°}$ is when Phase = -180°

b.) $|T(j\omega_{-180°})| < 1$

Poor stable