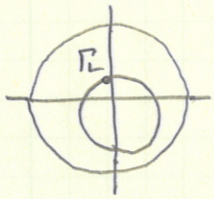
EIEN 464	HW 5 SOLUTION	

① Bilateral design

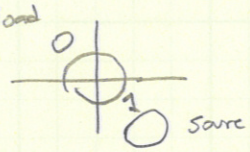
(a) $G_{p,max} = 12.7$ dB

(b)



(c) $\Gamma_S = 0.77 \angle 120°$, $\Gamma_L = 0.35 \angle 107°$

(d)



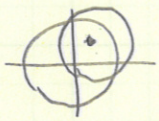
Both circles are outside the unit circle
The transistor is unconditionally stable.

② (a) $F = 0.77$ dB, $T_{eq} = 56$ K

(b) $P_{sin} = -106$ dBm

(c) $DR = 93$ dB

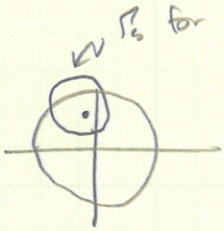
③ $\Gamma_S = \Gamma_{opt}$,



$C_L = 0.45 \angle 60°$, $r_L = 0.5$

Γ_L can be anywhere on this circle.

④ NF = 2.5 dB, max. gain



$N = 0.14$, $C_F = 0.71 \angle 100°$, $r = 0.3$

Conjugate match the load: $\Gamma_L = 0.7 \angle 60°$

⑤ At resonance, $j\omega L = \frac{-1}{j\omega C} \Rightarrow \omega = \frac{1}{\sqrt{LC}} = 1.4 \times 10^9$ rad/s $= 225$ MHz

R_L, max power $= \frac{R_0}{3} = 10\Omega$