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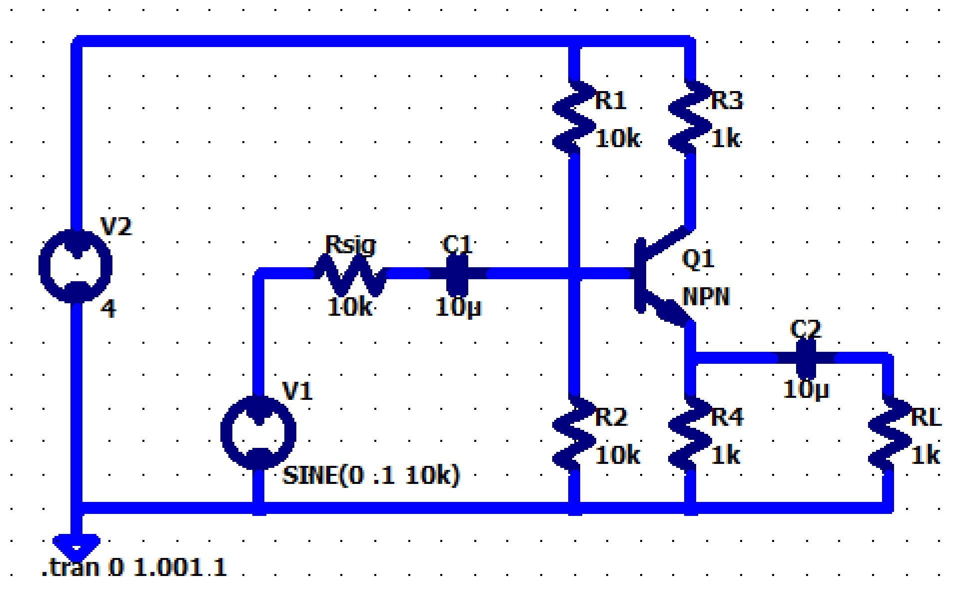
IE lab 4 part2

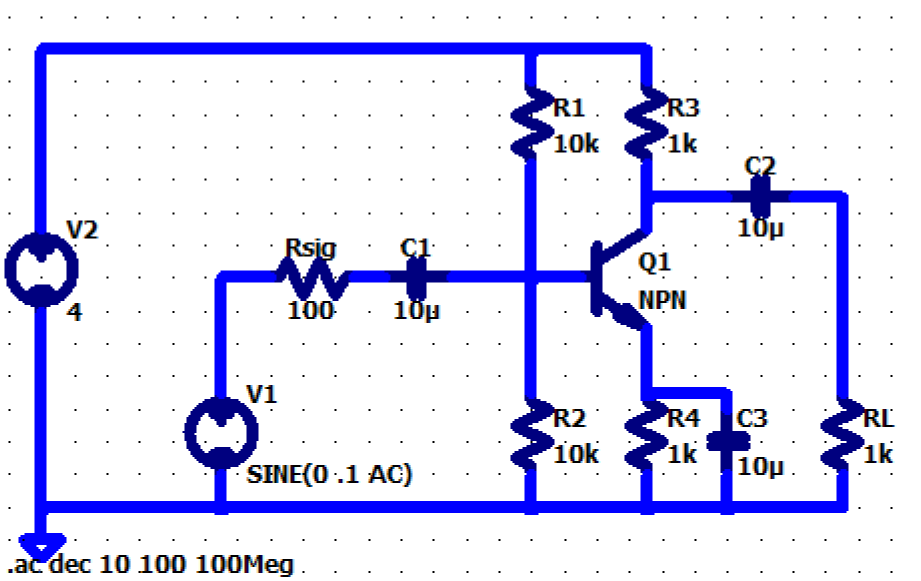
Pre Lab Exercise 2:

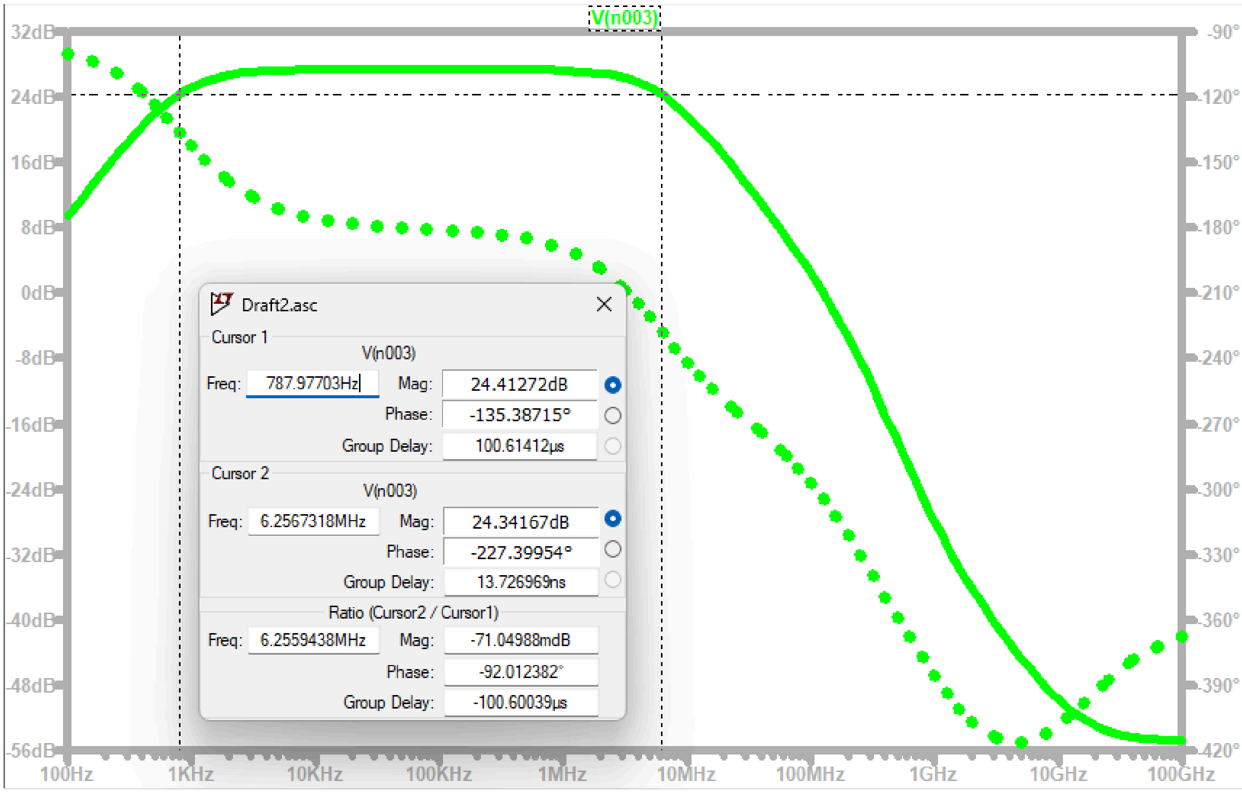
1. Implement the Exercise 3 circuit (shown below) in PSpice (common C amplifier), setting VCC = 4 V, RSig = 10 kΩ and RL = 1 kΩ. Set the source to a 10 kHz, 0.2 Vpp sinusoidal voltage signal. Identify the passband voltage gain (AVOC).




AVOC=Vout/Vin=0.3=-10.45dB

2. Implement the Exercise 4 circuit (shown below) in PSpice (common E amplifier), setting VCC = 4 V, RSig = 100 Ω and RL = 1 kΩ, and run an AC sweep. Identify the passband gain (AVOC) and the low frequency and high frequency cutoff values (–3-dB points).






AVOC=27.4dB
Low cutoff=788Hz
High cutoff=6.35MHz

Exercise 2:
For the PSpice simulations, the transistors are Q2N2222 and for the experimental portion, the transistors are PN2222.

1) Build the circuit shown below, using VCC = 4.0 V.
2) Measure DC quantities VBE, VCE, IB, IC, and IE using the multimeter on the bench. The bench multimeter has a better input impedance than the Mobile Studio or Discovery Board. To measure IB , use KCL with regard to IR1 and IR2 .

VBE=0.6396V
VCE=1.3468V
VR1=2.0312V
VR2=1.9662V
IR1=0.20312mA
IR2=0.19662mA
IB=IR1-IR2=0.00650mA=6.50uA
VC=1.3292V
IC=1.3292mA
VE=1.3320V
IE=1.3320mA

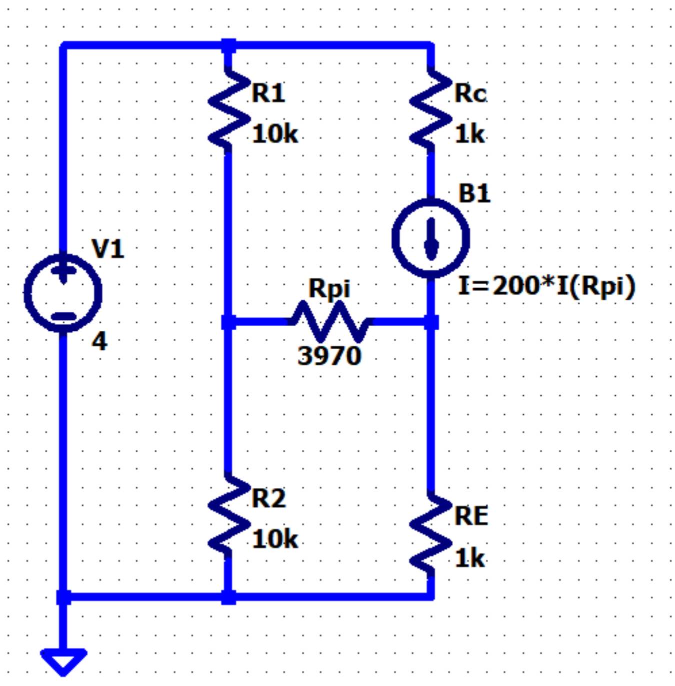
3) Verify that the circuit is in the forward active region.

We can see that we're in the forward active region because VBE~=0.7V

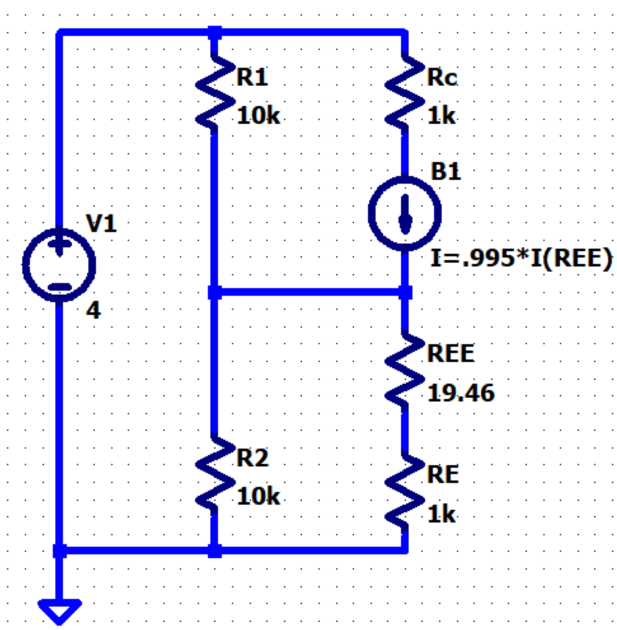
4) For the present DC biasing, determine rE using the equation rE = Vthermal / IE. Determine the common emitter current gain, β = IC / IB. Is the β value consistent with your previous determination of β (assuming that you are using the same transistor)? In your report, draw the small signal equivalent circuit of the DC bias circuit using the T-shaped and π-shaped BJT model.

rE=Vthermal/IE=26mV/1.3320mA=19.51Ohms
β=IC/IB=204.5
g=IC/Vthermal=1.3292mA/26mV=51.1mS
Rpi=β/g=200/51.1mS=3970 Ohms
a=B/(B+1)=.995
RE=.995/g=19.46 Ohms

Pi:


R1
10k
Rc
1k
B1
V1
I=200*I(Rpi)
Rpi
3970
4
R2
10k
RE
1k

T:


R1
10k
Rc
1k
B1
V1
I=.995*I(REE)
4
REE
19.46
R2
10k
RE
1k