

# Prelab 7 and 8

7/3/22

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## Part 1: Lab 7

Table

| $V_1 = 4$  | $V_2$ | $I_B$        | $I_C$        | $I_E$        | $V_{CE}$ | $\beta$  |
|------------|-------|--------------|--------------|--------------|----------|----------|
|            | 0     | 11.5 $\mu$ A | 7.94 $\mu$ A | 3.56 $\mu$ A | 4        | 0.715315 |
|            | 4     |              | 730          | 741          | 8        | 65.76577 |
|            | 8     |              | 768          | 779          | 12       | 69.18919 |
|            | 12    |              | 806          | 817          | 16       | 72.61261 |
|            | 24    |              | 919          | 930          | 28       | 82.79279 |
|            | 30    | 11.1         | 987 mA       | 975 $\mu$ A  | 34       | 88.91892 |
|            | 50    |              | 1.17         | 1.18         | 54       | 105.4054 |
|            | 75    |              | 1.40         | 1.41         | 79       | 126.1261 |
|            | 100   |              | 1.64         | 1.65         | 104      | 147.7477 |
|            | 150   |              | 2.11         | 2.12         | 154      | 190.0901 |
|            | 202   | 11.1         | 2.60         | 2.61         | 206      | 234.2342 |
| $V_1 = 6$  | 0     | 18.1 $\mu$ A | 10.5 $\mu$ A | 7.61 $\mu$ A | 6        | 0.589888 |
|            | 4     |              | 1.24 mA      | 1.25 mA      | 10       | 69.66292 |
|            | 8     | 17.8         | 1.30         | 1.32         | 14       | 73.03371 |
|            | 12    |              | 1.36         | 1.38         | 18       | 76.40449 |
|            | 24    |              | 1.55         | 1.57         | 30       | 87.07865 |
|            | 30    |              | 1.65         | 1.67         | 36       | 92.69663 |
|            | 50    |              | 1.97         | 1.99         | 56       | 110.6742 |
|            | 75    |              | 2.37         | 2.39         | 81       | 133.1461 |
|            | 100   |              | 2.77         | 2.79         | 106      | 155.618  |
|            | 150   |              | 3.57         | 3.58         | 156      | 200.5618 |
|            | 200   |              | 4.37         | 4.38         | 206      | 245.5056 |
| $V_1 = 8$  | 0     | 24.7 $\mu$ A | 12.3 $\mu$ A | 12.5 $\mu$ A | 8        | 0.497976 |
|            | 8     |              | 1.85 mA      | 1.87 mA      | 16       | 74.89879 |
|            | 16    |              | 2.03         | 2.05         | 24       | 82.18623 |
|            | 24    |              | 2.21         | 2.23         | 32       | 89.47368 |
|            | 30    |              | 2.35         | 2.37         | 38       | 95.1417  |
|            | 50    |              | 2.80         | 2.83         | 58       | 113.3603 |
|            | 75    |              | 3.37         | 3.39         | 83       | 136.4372 |
|            | 100   |              | 3.94         | 3.96         | 108      | 159.5142 |
|            | 150   |              | 5.07         | 5.10         | 158      | 205.2632 |
|            | 198   |              | 6.19         | 6.16         | 206      | 250.6073 |
| $V_1 = 10$ | 0     | 31.4 $\mu$ A | 13.6 $\mu$ A | 17.8 $\mu$ A | 10       | 0.43871  |
|            | 5     | 31           | 2.31 mA      | 2.34 mA      | 15       | 74.51613 |
|            | 10    |              | 2.46         | 2.49         | 20       | 79.35484 |
|            | 30    |              | 3.05         | 3.08         | 40       | 98.3871  |

|  |     |  |      |      |     |          |
|--|-----|--|------|------|-----|----------|
|  | 50  |  | 3.64 | 3.67 | 60  | 117.4194 |
|  | 75  |  | 4.38 | 4.41 | 85  | 141.2903 |
|  | 100 |  | 5.12 | 5.15 | 110 | 165.1613 |
|  | 150 |  | 6.59 | 6.63 | 160 | 212.5806 |
|  | 196 |  | 7.95 | 7.98 | 206 | 256.4516 |

$$V_{CE} = V_{CB} + V_{BE} \rightarrow V_2 + V_1$$

$$V_{CE} = V_{CC} - I_C R_C$$

Multisim

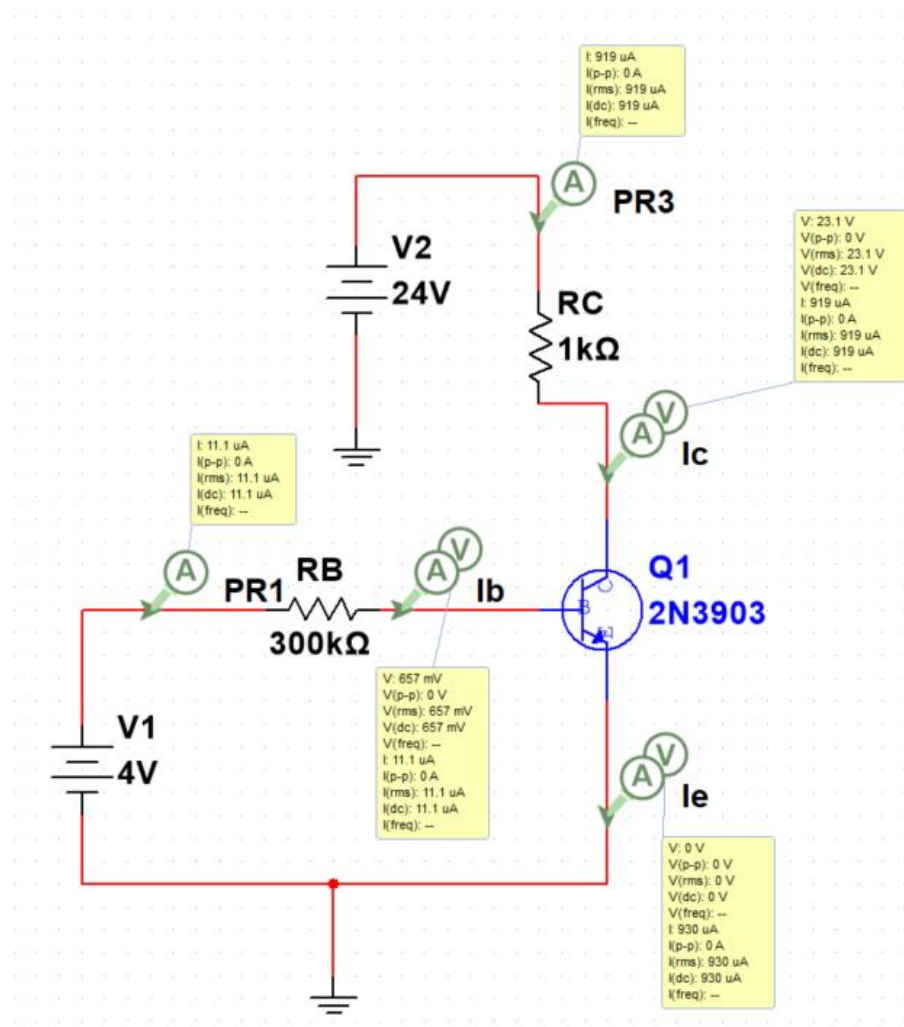
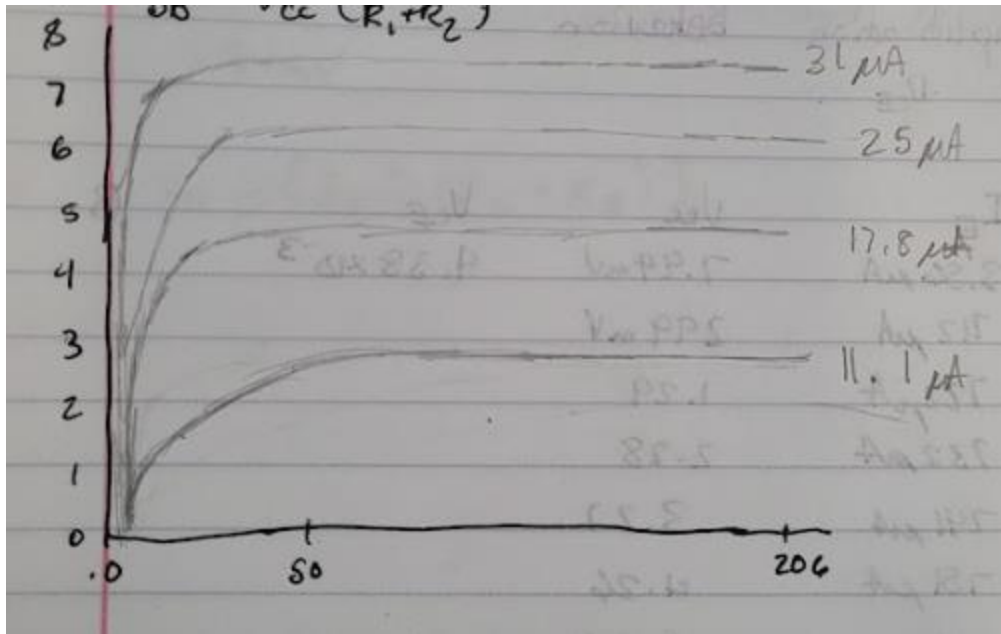


Figure 1. Lab 7 circuit

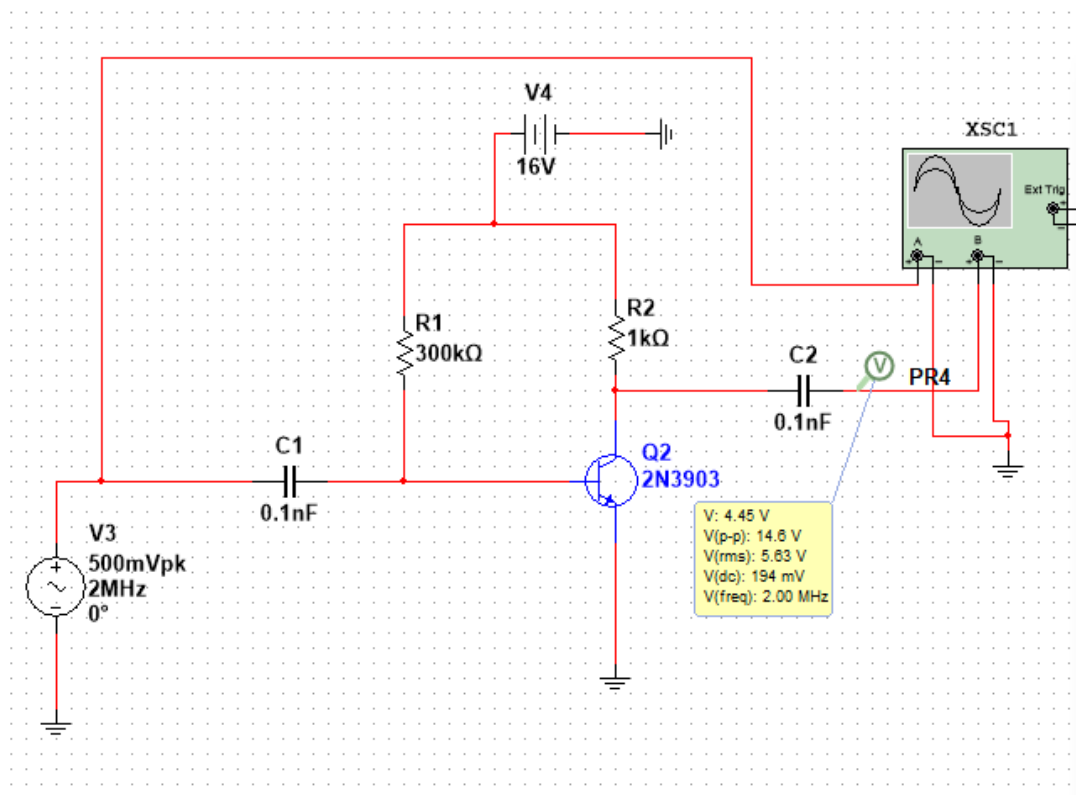
Plot

I have no idea as of right now how to calculate and find the q point. I also don't think my plot is correct.



**Figure 2.** Characteristic curves

## Part 2: Lab 8



**Figure 3.** BJT Amplification Common Collector in Multisim

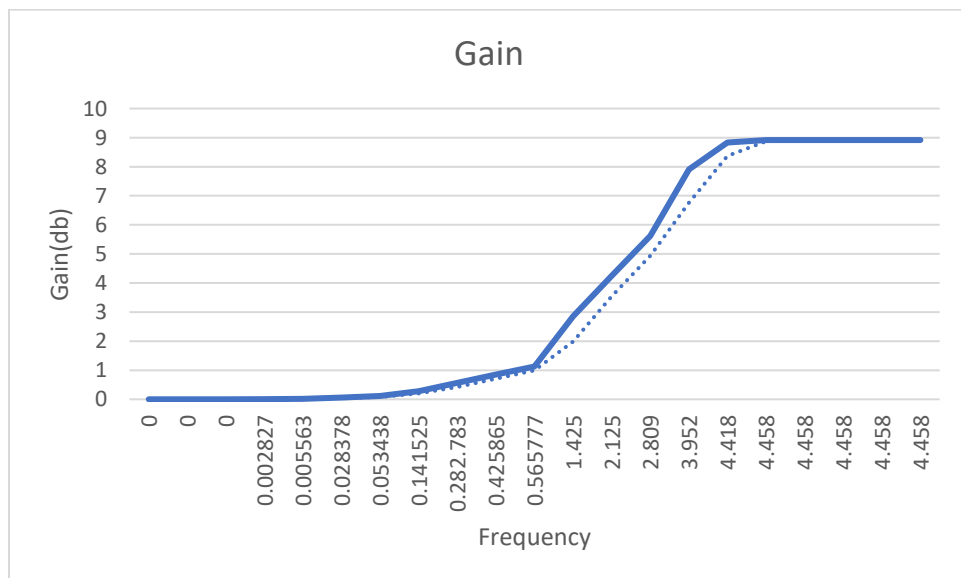
Table

| F(HZ) | V <sub>OUT</sub>        | Gain(db) |
|-------|-------------------------|----------|
| 10    | 0                       | -4.967   |
| 30    | clipped                 |          |
| 60    | clipped                 |          |
| 100   | 2.827 mV                | 0.005654 |
| 200   | 5.563 mV                | 0.011126 |
| 1k    | 28.378 mV               | 0.056    |
| 2k    | 56.438 mV               | 0.112876 |
| 5k    | 141.525 mV              | 0.28305  |
| 10k   | 282.783 mV              | 0.565566 |
| 15k   | 425.865 mV              | 0.85173  |
| 20k   | 565.777 mV              | 1.131554 |
| 50k   | 1.425                   | 2.85     |
| 75k   | 2.125                   | 4.25     |
| 100k  | 2.809                   | 5.618    |
| 150k  | 3.952                   | 7.904    |
| 200k  | 4.418                   | 8.836    |
| 500k  | 4.458                   | 8.916    |
| 750k  | Clipped (same as above) | 8.916    |
| 1M    | clipped                 | 8.916    |
| 1.5M  | Clipped                 | 8.916    |
| 2M    | clipped                 | 8.916    |

Gain:  $V_{out}/500\text{mV}$

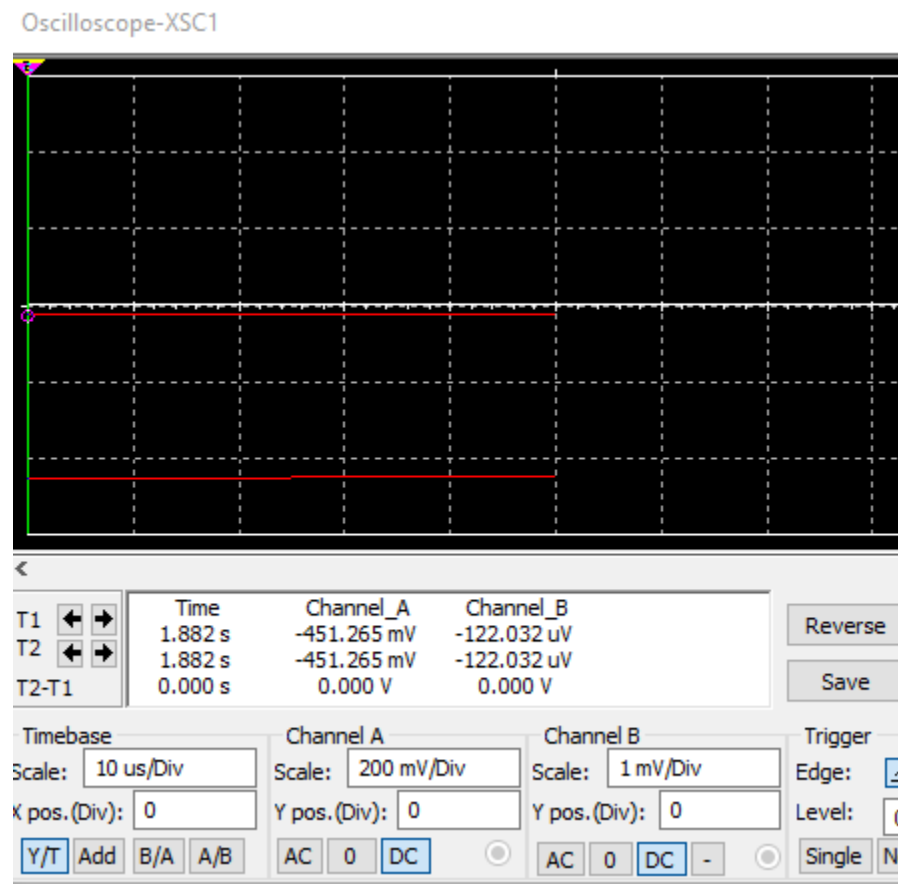
At 200k Hz the waveform starts to become clipped and further gets clipped from then on

Plot



**Figure 4.** Plot of Gain

Output Waveforms



**Figure 5.** 10 Hz waveform Output

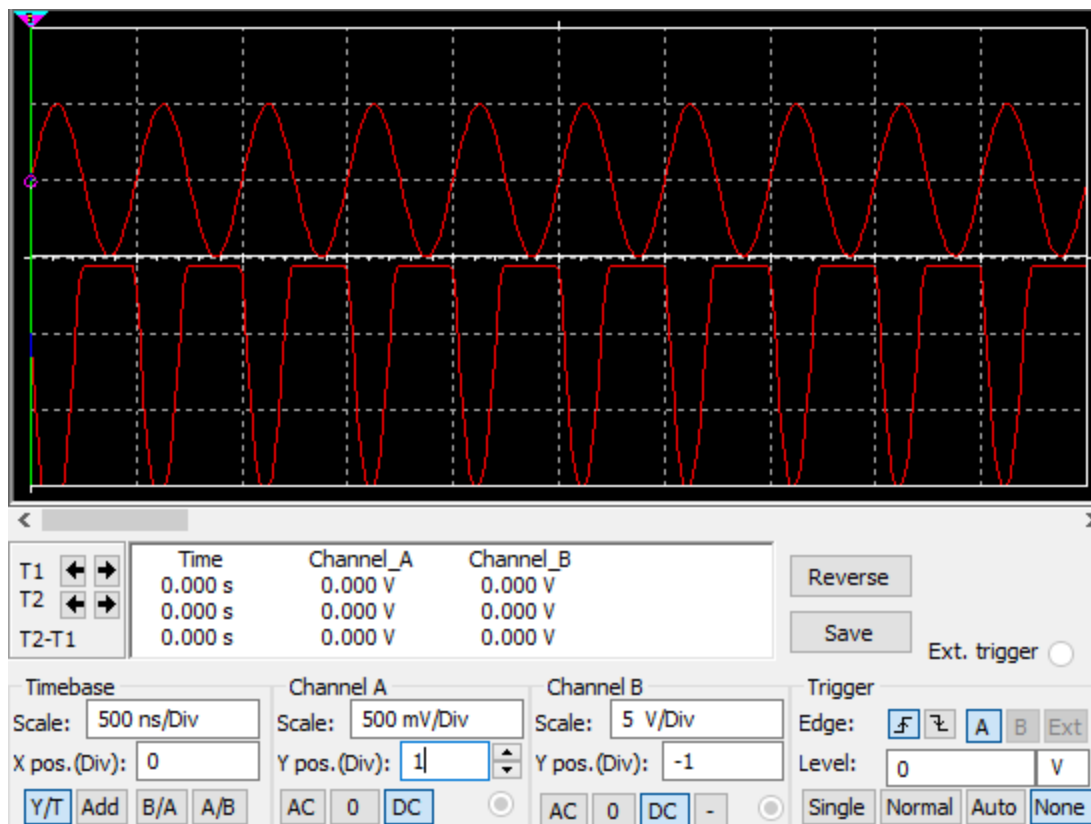


Figure . 2M Hz Output Waveform