6.28 large β $I_C \approx I_E$

V_E $I_E = \frac{10.7 - 0.7}{10\,k} = 1mA \approx I_C$

$V_2 = -10.7 + 1mA \cdot 10k = -0.7V$

---

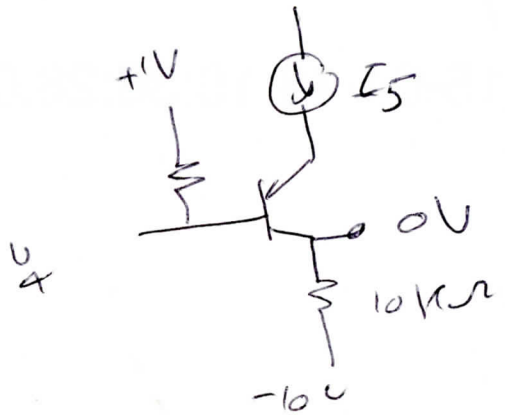
c)

$I_C = \frac{0-(-10)}{10} = 1mA$

$I_5 = 1mA$

$I_B = 0$

$U_4 = 1V$



6.33

6.49

(a) Active

$I_C = \frac{5-1}{1K} = 4mA \quad I_B = \frac{4}{50} = 0.08mA$

$V_{BB}: 0.7 + 20 \times 0.08 = 2.3V$

(b) $V_C = 0.3$ & Repeat $I_C = \frac{5-0.3}{1K}$ ...

(c) Sat $V_C = 0.2V$

6.55 Normal Condition $V_B = 0$

$V_E = -0.7V$

$I_E = 1 \quad \frac{-0.7}{1K\Omega} = -0.3mA \approx I_C$

$V_C = (5-0.3) \times 1K\Omega = 4.7V$

At cutoff $V_{BE} = 0.5V$

$V_E = -|x| \; 1V$ (all current is through P_E, no I_E)

6.55 Cont. (b)

$V_B = -1 + 0.5 = -0.5\ V$

$I_C = I_E = 0$

---

sat.

$V_{CE} = 0.2V \qquad V_C = V_E + 0.2$

$I_C = \frac{5 - V_C}{1} \qquad I_E = \frac{V_E}{1} + 1 \qquad I_E = I_C$

$\frac{5 - V_C}{1} = V_E + 1 \rightarrow \frac{5 - (V_E + 0.1)}{1} = V_E + 1$

$V_E = 2.1V$

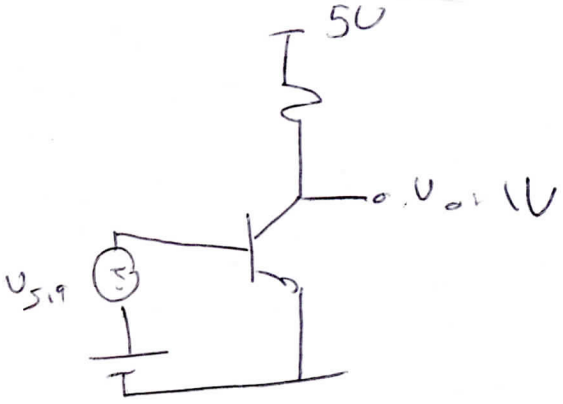
$V_B = 2.1 + 0.7 = 2.8$

$V_C = V_E + 0.2 = 2.3V$

6.71

$V_o = 0.3V$ @ sat

$\Delta V_o = -0.7V$



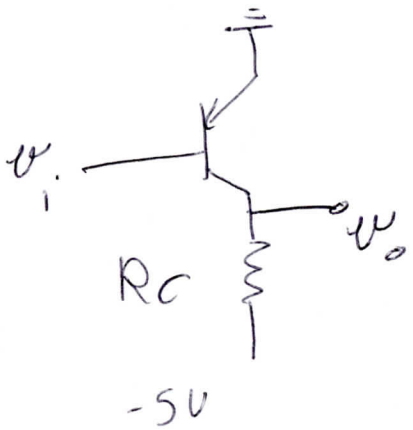
$I_C = \frac{V_{CC} - V_o}{R_C}$

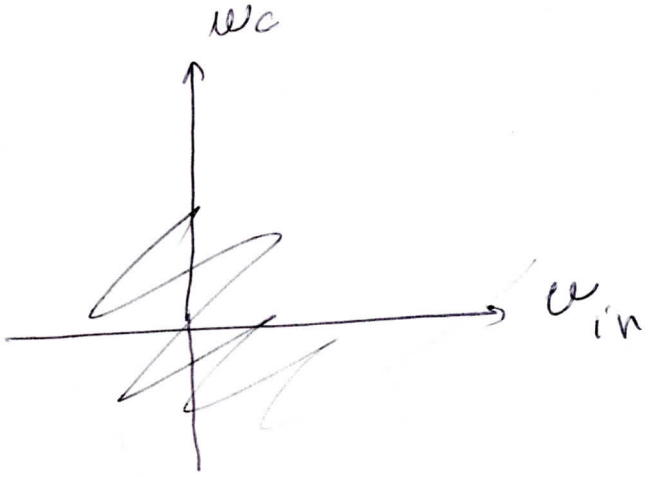
$\frac{I_{C1}}{I_{C2}} = \frac{4}{4.7} \rightarrow \frac{4.7}{4} = e^{\frac{\Delta V_{BE}}{V_T}}$

6.71 Cont.

ΔV_{BE}: 4.03 mV

6.77





v_I down to -0.5V cutoff $v_o = -5V$

v_I < -5V ON current flows; v_o rises

(A) Sat $v_o = v_{CE\,sat}$: 0.2V