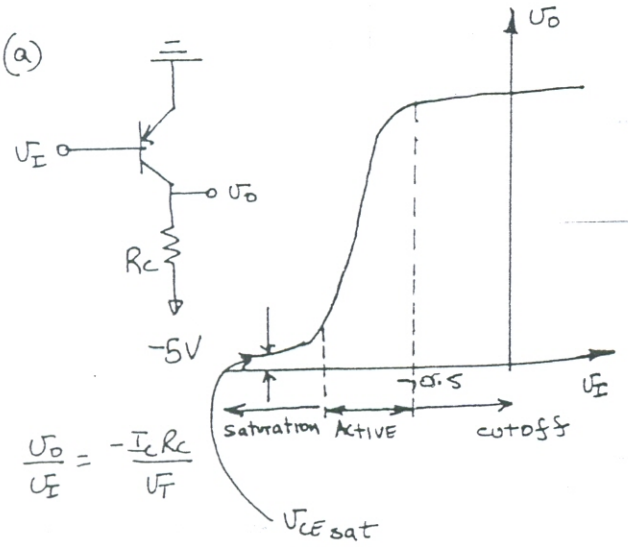
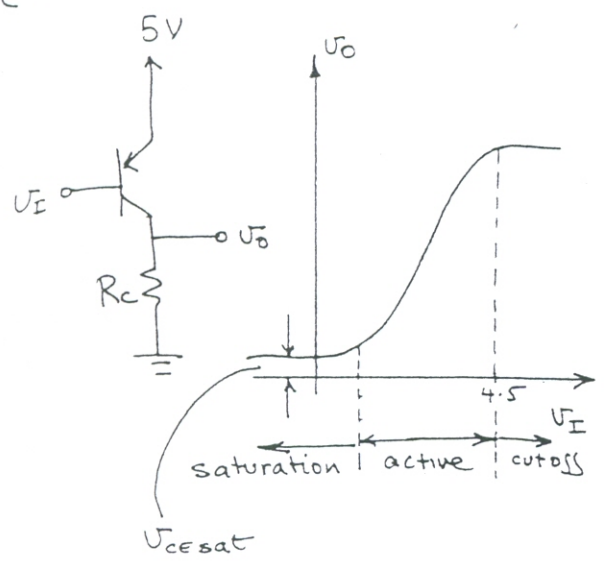
5.58

(a)

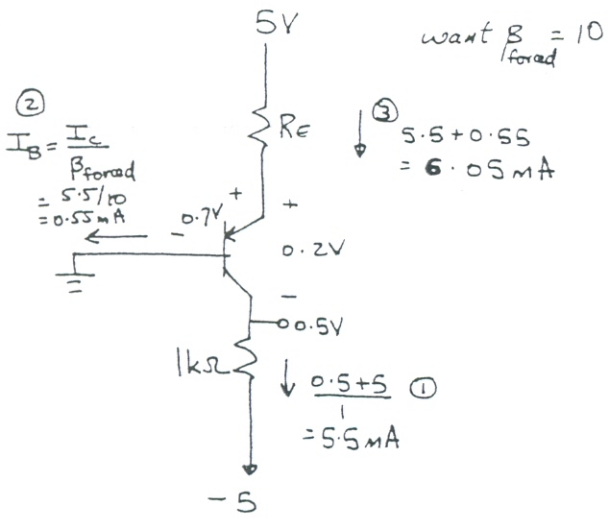


$$\frac{V_O}{V_I} = \frac{-I_C R_C}{V_T}$$

(b)



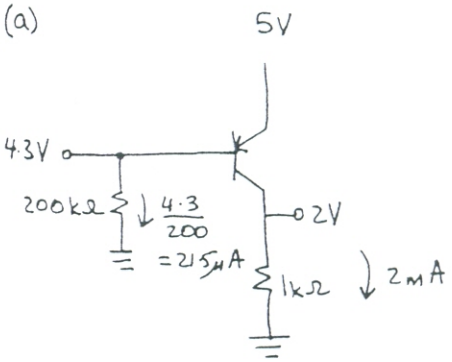
5.66



$$R_E = \frac{5 - 0.7}{6.05} = \underline{710\,\Omega}$$

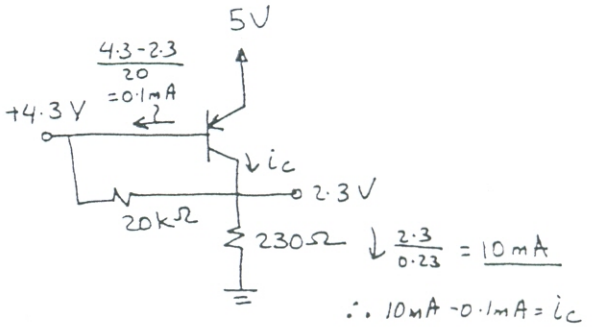
5.21

(a)



$$\frac{i_C}{i_B} = \beta = \frac{2}{0.0215} = \underline{93.0}$$

(b)



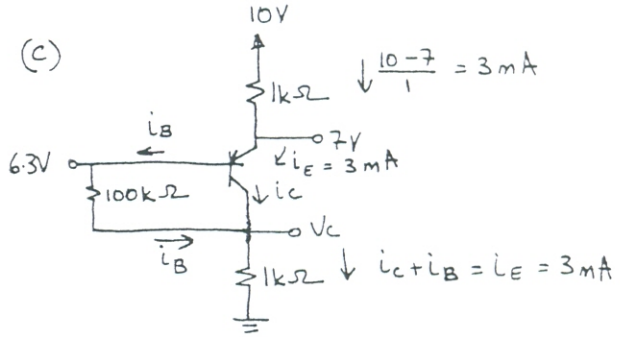
$\therefore 10\,mA - 0.1\,mA = i_C$

$9.9\,mA = i_C$

$$\frac{i_C}{i_B} = \frac{9.9}{0.1} = \beta$$

$$\beta = \underline{99}$$

(c)



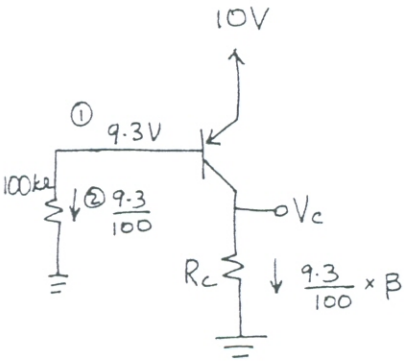
$V_C = 3 \times 1 = 3V$

$$i_B = \frac{6.3 - 3}{100} = \frac{3.3}{100}$$

$$\beta + 1 = \frac{i_E}{i_B} = \frac{3 \times 100}{3.3}$$

$$\beta = \frac{300}{3.3} - 1 = \underline{89.9}$$

5.82



For $V_c = 5V = \frac{9.3}{100} \times \beta \times R_c$ $\beta = 50$

$$R_c = \frac{500}{9.3 \times 50} = \underline{1.08\,k\Omega}$$

For $\beta = 100$

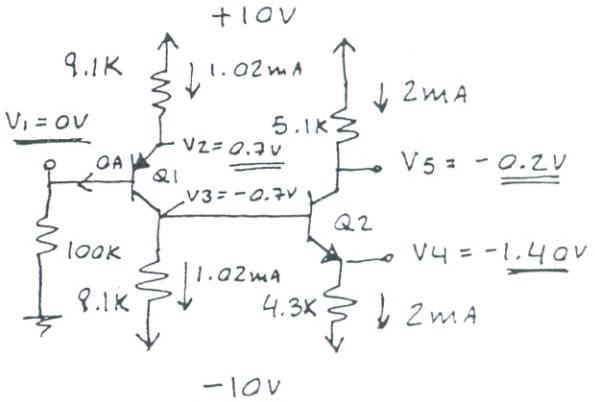
$$V_c = \frac{9.3}{100} \times \beta \times R_c = \frac{9.3}{100} \times 100 \times 1.08$$

$$= \underline{10.04V} \leftarrow V_{BC} = 9.3 - 10.04 = -0.74$$

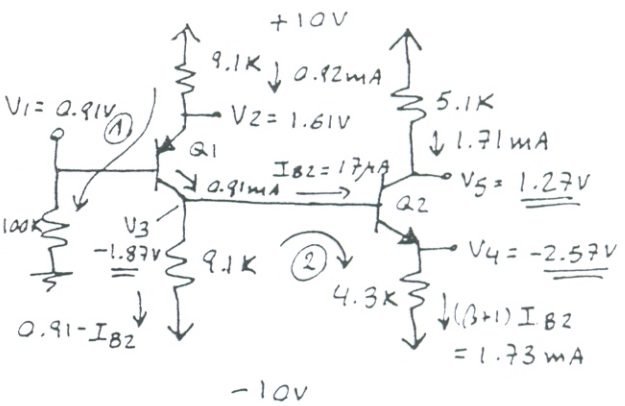
Since $V_{BC} < -0.4V$ the transistor saturates!

5.84

(a) $\beta = \infty$



(b) $\beta = 100$



① $10 - 9.1(\beta+1)I_{B1} - 0.7 - 100I_{B1} = 0$

$\rightarrow I_{B1} = 0.009\,mA$

② $(0.91 - I_{B2}) \times 9.1 = 0.7 + (\beta+1) I_{B2} \times 4.3$

$\rightarrow I_{B2} = 0.017\,mA$

$\rightarrow I_{E2} = 1.73\,mA$