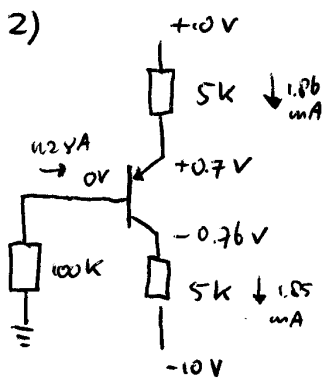
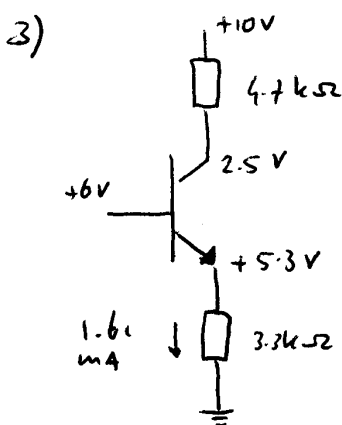


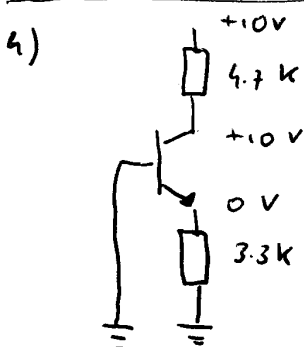
- ① $V_{BE} = 0.7 V \Rightarrow V_E = -0.7 V$
- ② $I_E = (-0.7 - (-10)) / 10 k\Omega = 0.930 mA$
- ③ $\beta = 50 \Rightarrow I_B = \frac{I_E}{\beta + 1} = \frac{0.93 mA}{51} = 18.2 \mu A$
- $I_C = \beta I_B = \alpha I_E = \frac{\beta}{\beta + 1} I_E$
- $= \frac{50}{51} \cdot 0.93 mA = 0.912 mA$
- ④ $V_C = +10 V - I_C \cdot R_C = +10 - 0.912 \cdot 10^{-3} \cdot 5 \cdot 10^3 = +5.44 V$



- ① $V_B \sim 0 V$ (porque $I_B \sim 0$)
- ② $V_{EB} = 0.7 V \Rightarrow V_E = +0.7 V$
- ③ $I_E = (10 - 0.7) / 5 k = 1.860 mA$
- ④ $I_B = I_E / \beta + 1 = 11.2 \mu A$ ($V_B = 0 - 100 \cdot 10^3 \cdot 11.2 \cdot 10^6 = -1.12 V$)
- ⑤ $I_C = \frac{\beta}{\beta + 1} \cdot I_E = 1.849 mA$
- ⑥ $V_C = -10 V + 1.849 mA \cdot 5 k\Omega = -0.755 V$

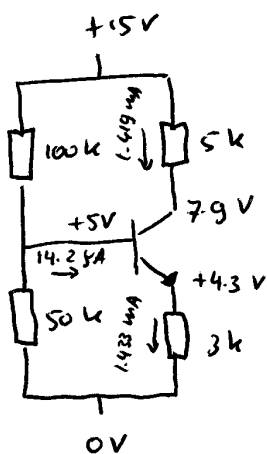


- ① $V_{BE} = 0.7 V \Rightarrow V_E = +5.3 V$
 - ② $I_E = V_E / R_E = 5.3 V / 3.3 k\Omega = 1.606 mA$
 - ③ $I_B = I_E / \beta + 1 = 7.99 \mu A$
 - ④ $I_C = I_E \cdot \beta / \beta + 1 = 1.598 mA$
 - ⑤ $V_C = +10 V - 4.7 k\Omega \cdot 1.598 mA = 2.489 V$
- $V_{BC} > 0$ "curto circuito" erro !



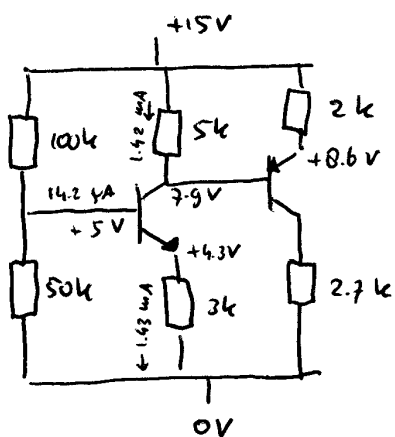
- ① $V_{BE} = 0 V \Rightarrow I_B = 0, I_E = 0 \Rightarrow I_C = 0$
- $\Rightarrow V_C = +10 V$

5)



- ① $r_{in} = (\beta + 1) \cdot (r_E + R_E) > 3 \text{ M}\Omega \approx \infty$
- ② $V_B = V_{CC} \cdot \frac{R_{B1}}{R_{B1} + R_{B2}} = +15 \cdot \frac{50 \text{ k}}{50 \text{ k} + 100 \text{ k}} = +5 \text{ V}$
- ③ $V_E = V_B - 0.7 \text{ V} = 4.3 \text{ V}$
- ④ $I_E = (V_E - V_{EE}) / R_E = (4.3 \text{ V} - 0 \text{ V}) / 3 \text{ k}\Omega = 1.433 \text{ mA}$
- ⑤ $I_B = I_E / \beta + 1 = 14.2 \text{ }\mu\text{A}$
- ⑥ $I_C = I_E \cdot \frac{\beta}{\beta + 1} = 1.419 \text{ mA}$
- ⑦ $V_C = V_{CC} - I_C \cdot R_C = +15 - 1.419 \cdot 10^{-3} \cdot 5 \cdot 10^3 = 7.904 \text{ V}$

6)



segundo andar

- ① $V_{B2} = +7.9 \text{ V}, V_{EB} = 0.7 \text{ V} \Rightarrow V_E = +8.6 \text{ V}$
- ② $I_{E2} = (+15 \text{ V} - 8.6 \text{ V}) / 2 \text{ k}\Omega = 3.2 \text{ mA}$
- ③ $I_{B2} = I_{E2} / \beta + 1 = 31.7 \text{ }\mu\text{A}$
- ④ $I_{C2} = I_{E2} \cdot \frac{\beta}{\beta + 1} = 3.17 \text{ mA}$
- ⑤ $V_C = 0 + 3.17 \text{ mA} \cdot 2.7 \text{ k}\Omega = 8.55 \text{ mA}$