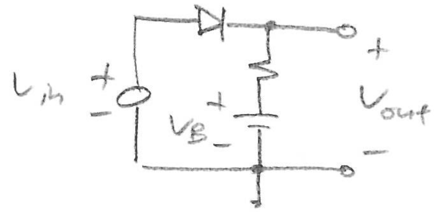
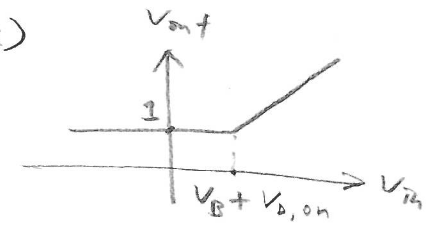
ECEn 340 Practice Midterm 1

Chiang

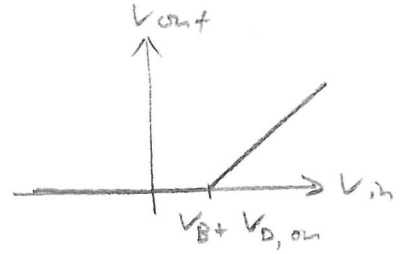
1. Plot I/p – O/p char. Assume constant-voltage model, $V_B = 1V$



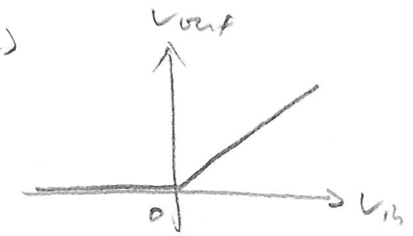
a)



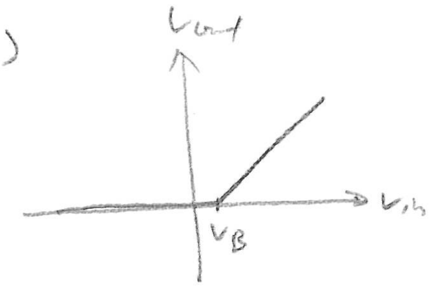
b)



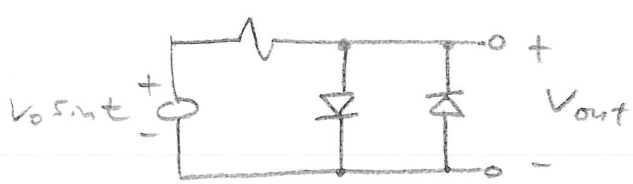
c)



d)



Given the following cir.



Assume constant-voltage diodes and $V_0 > V_{D,on}$. What is the maximum magnitude that V_{out} could achieve?

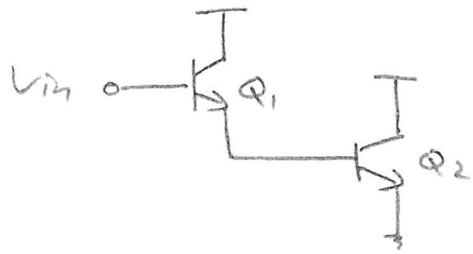
a) $V_0 - V_{D,on}$

b) $V_{D,on}$

c) V_0

d) $V_0 + V_{D,on}$

3. Find the input resistance at the base of Q_1



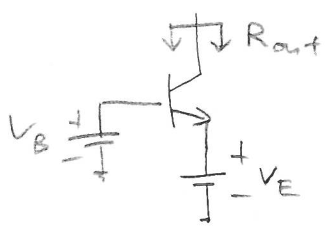
a) $r_{\pi 2} + \beta r_{\pi 1}$

b) $r_{\pi 1} + r_{\pi 2}$

c) $r_{\pi 1} + \beta r_{\pi 2}$

d) $r_{\pi 1}$

4. Determine the output resistance, $V_A \neq 0$



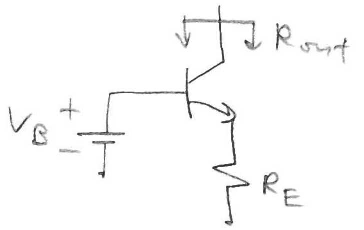
a) r_π

b) r_o

c) $r_\pi + r_o$

d) $r_\pi + \beta r_o$

5. What is R_{out}? Assume $r_\pi = \infty$, $V_A \neq \infty$.



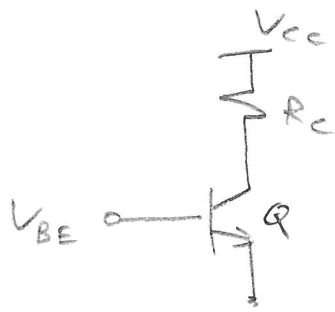
a) $r_o + R_E$

b) $r_o + \beta R_E$

c) $r_o + R_E + g_m r_o R_E$

d) $r_o + g_m r_o R_E$

6. What value of I_S would cause the transistor Q to be on the edge of saturation?



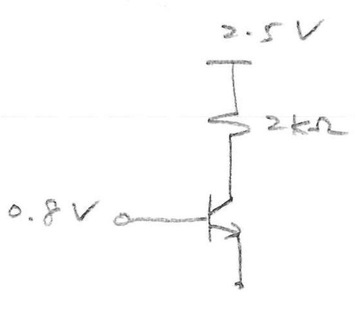
a) $\frac{V_{BE} - V_{CC}}{R_C} e^{-V_{BE}/V_T}$

b) $\frac{V_{BE} - V_{CC}}{R_C}$

c) $\frac{V_{CC} - V_{BE}}{R_C} e^{-V_{BE}/V_T}$

d) $\frac{V_{CC} - V_{BE}}{R_C}$

7. Find large-signal I_C. $V_A = 5$, $I_S = 10^{-17}$



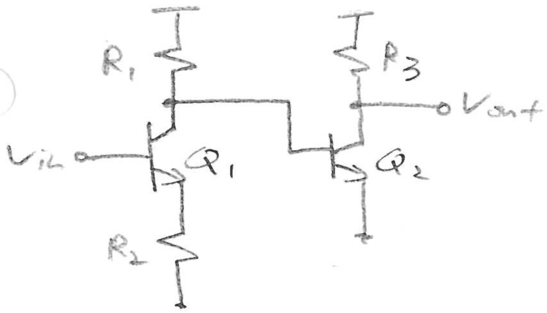
a) 2.31 mA

b) 3.17 mA

c) 0.231 mA

d) 0.317 mA

8. Find the gain. $V_A = \infty$.



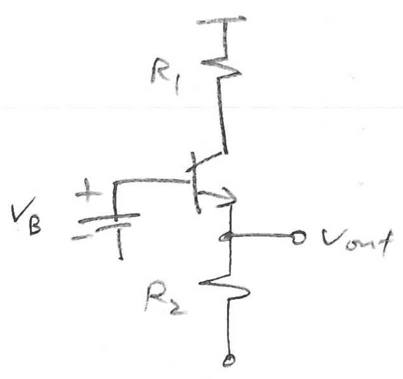
a) $\dfrac{g_{m1}(R_1 \parallel r_{\pi 2})}{1+g_{m1}R_2} g_{m2}R_3$

b) $\dfrac{g_{m1}R_1}{1+g_{m1}R_2} g_{m2}R_3$

c) $g_m R_1 g_m R_3$

d) $g_{m1}(R_1 \parallel r_{\pi 2}) g_{m2} R_3$

9. Find the gain. $V_A = \infty$



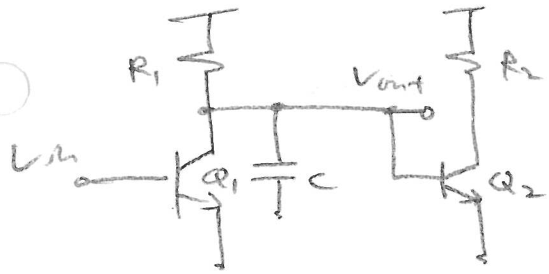
a) $\dfrac{g_m R_1}{1+g_m R_2}$

b) $g_m R_1$

c) $\dfrac{1}{1+g_m R_2}$

d) $g_m (R_1 \parallel R_2)$

10. Find the corner frequency of $\left|\frac{v_{out}}{v_{in}}\right|$. $V_A = \infty$.



a) $\frac{1}{R_1 C}$

b) $\frac{1}{(R_1 + R_2) C}$

c) $\frac{1}{(R_1 \| r_{\pi 1}) C}$

d) $\frac{1}{(R_1 \| r_{\pi 2}) C}$