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EE 210 **MID-SEM P4** **24.2.21**

A DC reference voltage (V_{REF}) generator circuit is shown in the figure. For Q, assume $\beta = 100$, and neglect Early effect. The DC current source I_{REF} is ideal.

a) Choosing the base current of Q to be 20% of the current flowing through R_1, design the values of R_1 and R_2 to produce $V_{REF} = 2$ V. *Caution: Do not use equations blindly.* **5**

b) *Quantitatively* prove that the DC power of the circuit is a conserved quantity, i.e., the DC power supplied by V_{CC} is completely dissipated in the circuit. **4**

c) What is the output resistance (R_0) of the designed voltage reference? Is it acceptable? Why or why not? **6**