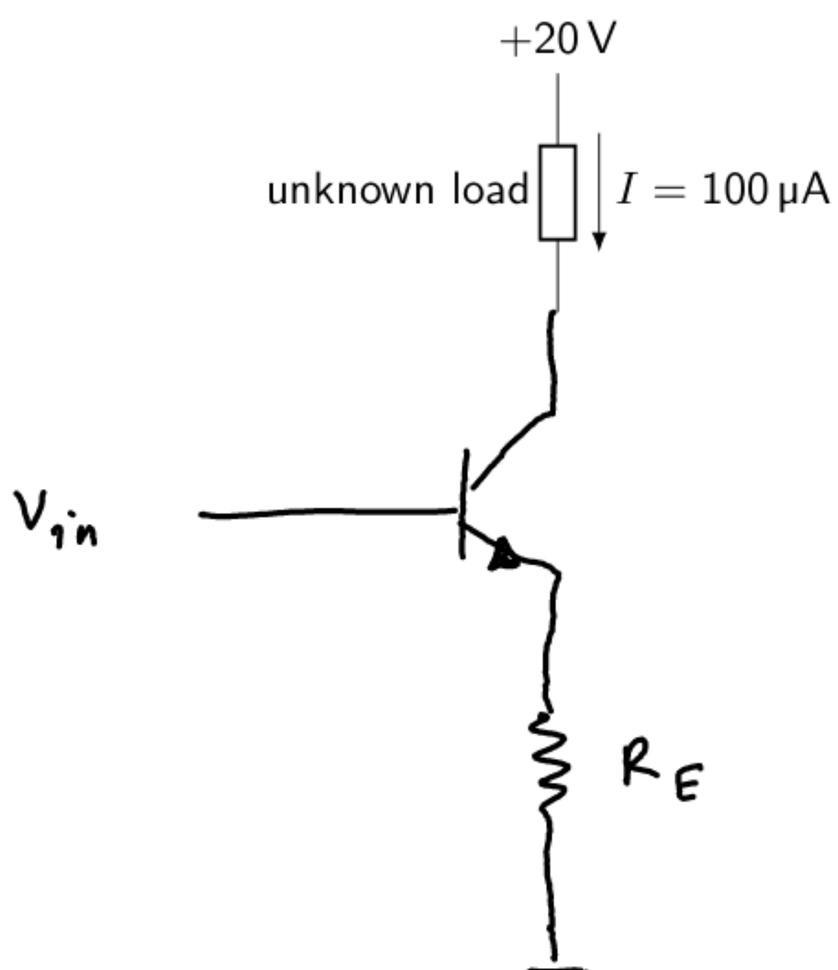
Pre-lab 8 Hand-in

Name: _____

Pre-lab 8.1 Draw an npn-BJT current source, to sink 100 µA from a load that is returned to +20 V. (In non-techie terms, your circuit connects to the bottom side of a load whose top side is connected to +20 V, and should cause 100 µA of current to flow, as shown below.)



▽

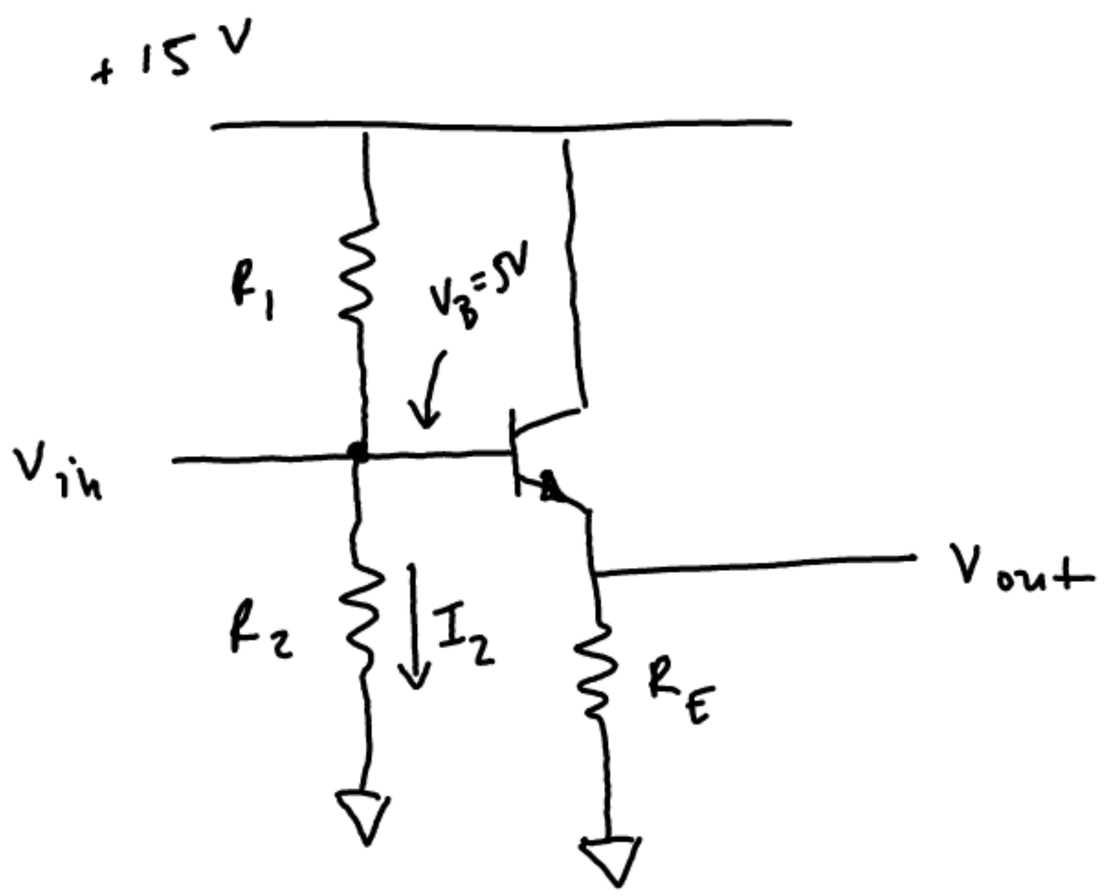
to get $100\,\mu A = I_E$, need $\frac{V_E}{R_E} = 100\,\mu A$

let $V_{in} = 5.6\,V$

$V_E = 5\,V \longrightarrow R_E = \frac{5\,V}{100\,\mu A} = 50\,k\Omega$

From the last lab:

Pre-lab 8.2 Use a follower with the base driven from a voltage divider to provide a stiff source of $+5$ volts from an available regulated $+15$V supply. Allow for a maximum current load of 25 mA. Choose your resistor values so that the outut voltage doesn't drop more than 5% under full load. [Hint: think about "droop" in the voltage divider if the transistor starts to pull too much base current. The base current should be at least 10 times smaller than whatever the voltage divider pulls to ground.]



to get $V_B = 5V$, divide 15 V by 3 : $R_2 = \frac{1}{2} R_1$

max current load $25\,mA = I_E = V_E / R_E$

$25\,mA = 4.4V / R_E$

$R_E = 176\,\Omega$

droop:

now set $I_B < I_2/10$

$I_2 = \frac{15V}{R_1 + R_2}$ $\qquad$ $I_B = I_E/\beta$

$\frac{25mA}{\beta} < \frac{15V}{3/2\, R_1} \cdot \frac{1}{10}$

$R_1 \sim 4\,k\Omega$

$R_2 \sim 2k\Omega$