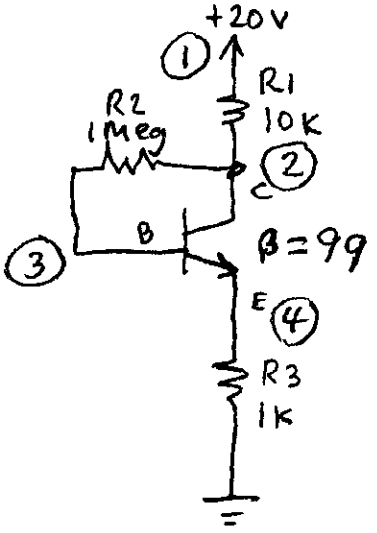
Name _____

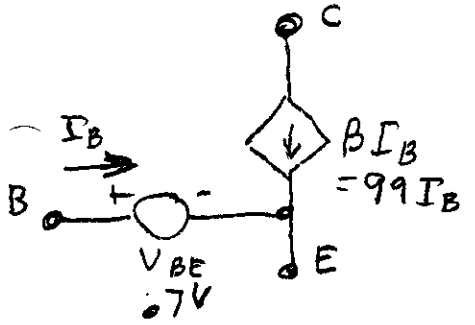
Find all node voltages;



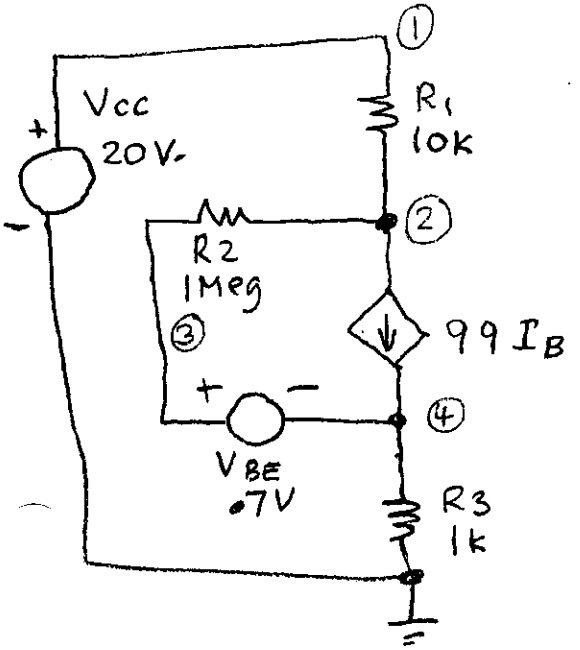
V_1
V_2
V_3
V_4

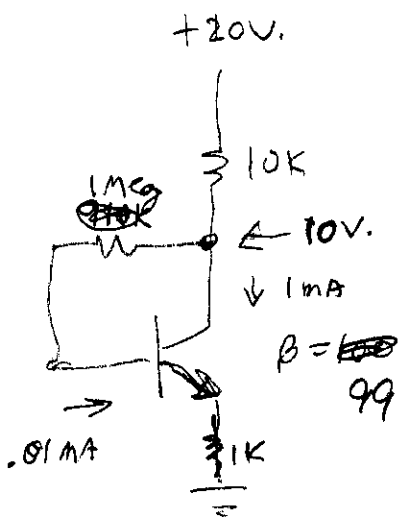
Did not collect.

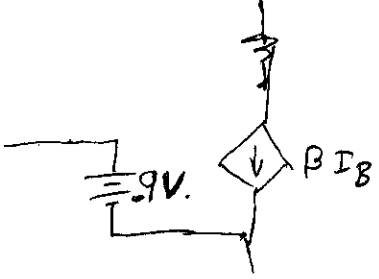
The transistor model is:

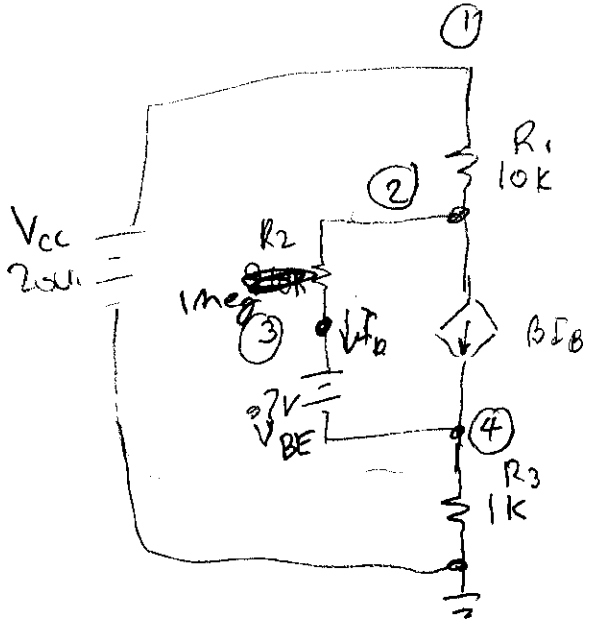


So the circuit with model is:









(1) $V_1 = V_{cc}$

(2) $\frac{V_2 - V_1}{R_1} + \frac{V_2 - V_3}{R_2} + \beta I_B = 0$

(3,4) $\frac{V_3 - V_2}{R_2} + \frac{V_4}{R_3} - \beta I_B = 0$ (I_B)

$V_3 = V_4 + V_{BE} \rightarrow V_4 = V_3 - V_{BE}$

$I_B = \frac{V_1 - V_3}{R_2}$

(2) $\frac{V_2-20}{10K} + \frac{V_2-V_3}{1meg} + 99\frac{V_2-V_3}{1Meg} = 0$

(3) $\frac{V_3-V_2}{1meg} + \frac{V_3-.7}{1k} + 99\frac{V_3-V_2}{1meg} = 0$

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(2) $\frac{V_2-20}{10K} + 100\frac{V_2-V_3}{1meg} = 0$

(3) $100\frac{V_3-V_2}{1meg} + \frac{V_3-.7}{1K} = 0$

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(2) $\frac{V_2-20}{10K} + \frac{V_2-V_3}{10K} = 0$

(3) $\frac{V_3-V_2}{10K} + \frac{V_3-.7}{1K} = 0$

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(2) $V_2-20+V_2-V_3=0$

(3) $V_3-V_2+10V_3-7=0$

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(2) $2V_2 = V_3+20$

$V_2 = \frac{V_3+20}{2} = \frac{V_3}{2}+10$

(3) $11V_3-V_2-7=0$

$11V_3-\frac{V_3}{2}-10-7=0$

$10.5V_3-17=0$

$V_3 = \frac{17}{10.5} = 1.619$

$V_2 = \frac{1.619}{2}+10$

$= 10.81$

$V_4 = .919$