EE 321

Fall 2002

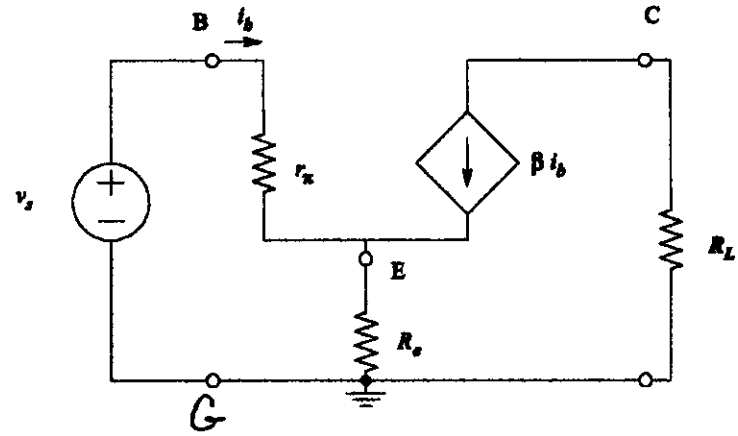
Homework #1

Solutions

EE321 – Fall 2002

Homework 1
Due August 30, 2002

1. Consider the circuit below:



(a) Find the voltage gain, v_C/v_B. v_B is the voltage at node B, v_C is the voltage at node C. The answers should be in terms of the circuit elements r_π, R_e, β and R_L.

$v_C = -\beta i_b R_L \qquad i_e = i_b + \beta i_b \qquad v_B = i_b r_\pi + R_e i_e$

$v_B = i_b r_\pi + (\beta i_b + i_b) R_e \Rightarrow i_b = \dfrac{v_B}{r_\pi + (\beta+1) R_e}$

$v_C = \dfrac{-\beta v_B R_L}{r_\pi + (\beta+1) R_e} \qquad \dfrac{v_C}{v_B} = \dfrac{-\beta R_L}{r_\pi + (\beta+1) R_e}$

(b) Find the input resistance between terminals B and G.

$R_{in} = \dfrac{v_B}{i_b} \qquad$ From (a) $i_b = \dfrac{v_B}{r_\pi + (\beta+1) R_e}$

$\therefore \; R_{in} = r_\pi + (\beta+1) R_e$