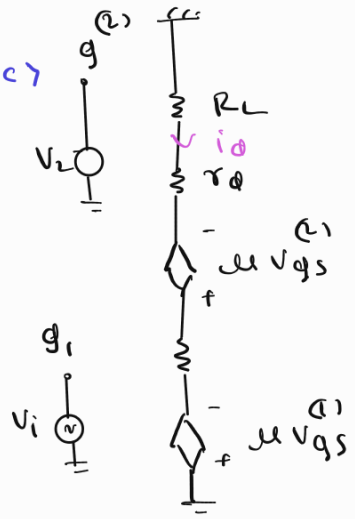
1. c)



$$i_d = \frac{\mu\left(V_{gs}^{(1)} + V_{gs}^{(2)}\right)}{R_L + 2r_d}$$

$$V_{gs}^{(1)} = V_1$$

$$V_{gs}^{(2)} = V_2 + \mu V_1 - i_d r_d$$

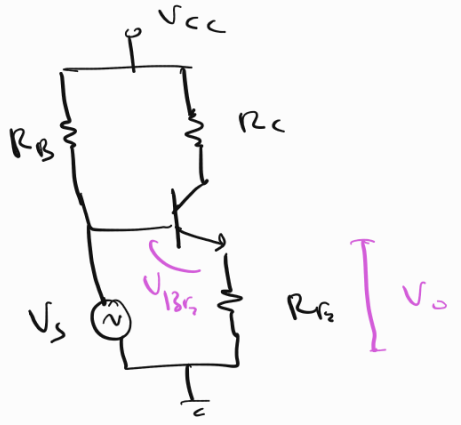
$$i_d = \frac{\mu\left(V_2 + V_1 + \mu V_1 - i_d r_d\right)}{2r_d + R_L}$$

$$\Rightarrow i_d\left(1 + \frac{\mu r_d}{2r_d + R_L}\right) = \frac{\mu\left(V_1 + V_2 + \mu V_1\right)}{2r_d + R_L}$$

$$i_d = \frac{\mu\left(V_1 + V_2 + \mu V_1\right)}{2r_d + R_L + \mu r_d}$$

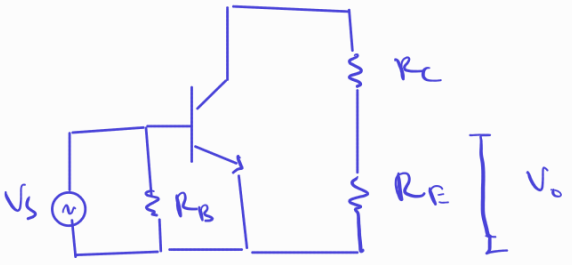
$$V_{R_L} = -i_d R_L$$

2.



$$V_{BE} = V_s - V_o$$

$$\beta = 1$$



$$V_o = h_{fe} i_b R_E$$

$$A_V = \frac{h_{fe} R_E}{h_{ie}}$$

$$A_{Vf} = \frac{\frac{h_{fe} R_E}{h_{ie}}}{1 + \frac{h_{fe} R_E}{h_{ie}}} = \frac{h_{fe} R_E}{h_{ie} + h_{fe} R_E}$$