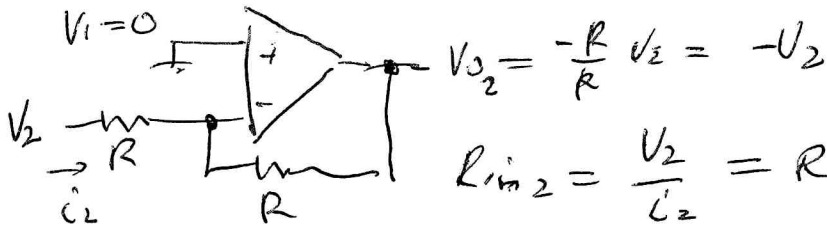
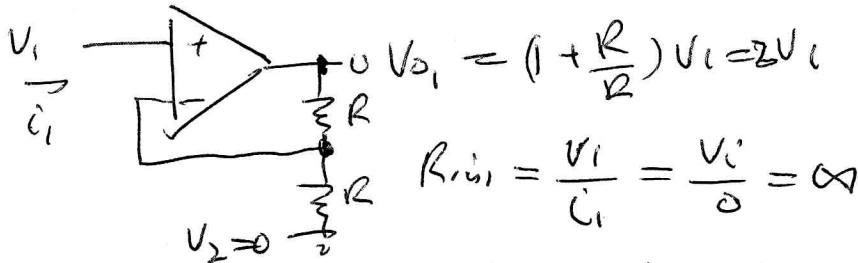
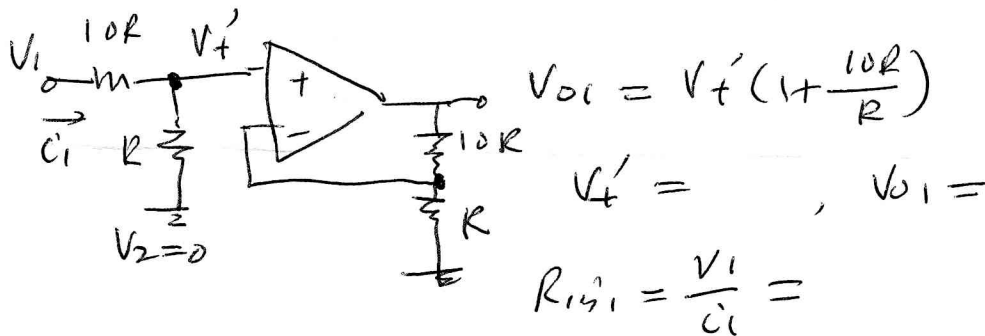
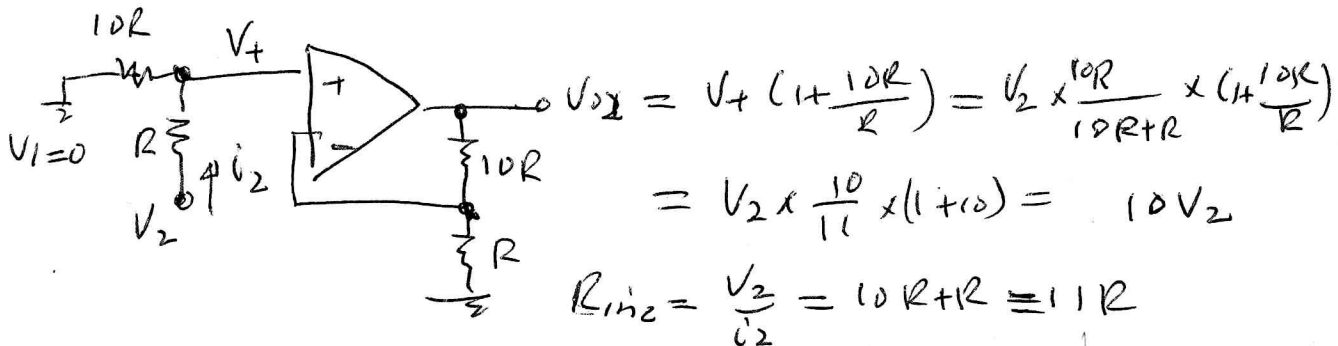


1(A)

Tutorial 1EE2002// short V_1 ~~// short V_2~~ // short V_2

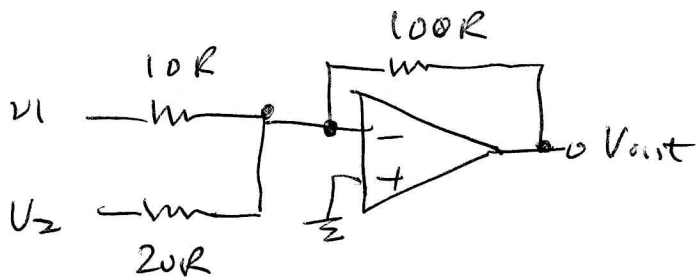
$$V_{out} = V_{01} + V_{02} =$$

- 1 (B)


 $11R // 10R$
 $= 11R$

$$V_{out} = V_{01} + V_{02}$$

1(C)



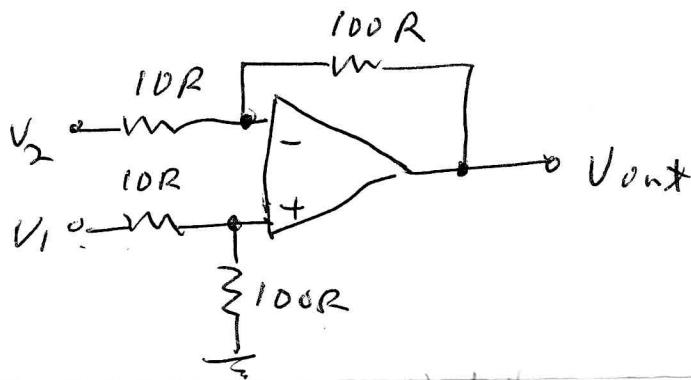
$$V_{out} = -\left(\frac{100R}{10R}\right)V_1 - \left(\frac{100R}{20R}\right)V_2$$

$$= -10V_1 - 5V_2$$

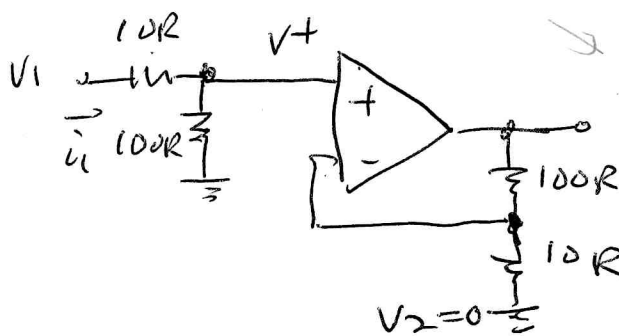
$$R_{in1} = \frac{V_1}{I_1} = 10R$$

$$R_{in2} = \frac{V_2}{I_2} = 20R$$

1(D)



short V_2 .

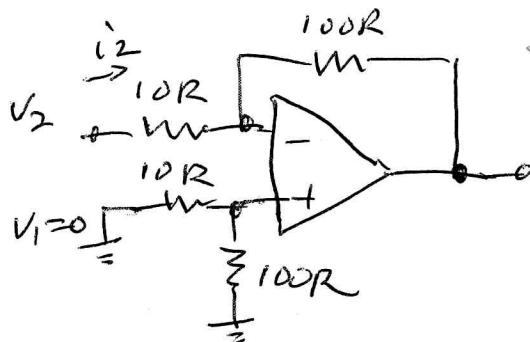


$$V_{out1} = V^+ \left(1 + \frac{100R}{10R}\right) = 11V^+$$

$$V^+ = 10V_1$$

$$\therefore V_{out1} = 10(10V_1 - V_2)$$

$$R_{in1} = \frac{V_1}{I_1} = 10R + 100R = 110R$$



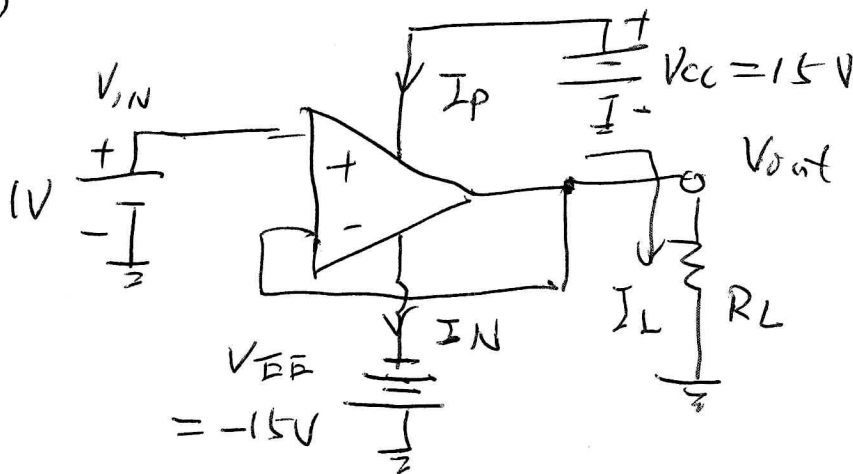
short V_1 .

$$V_{out2} =$$

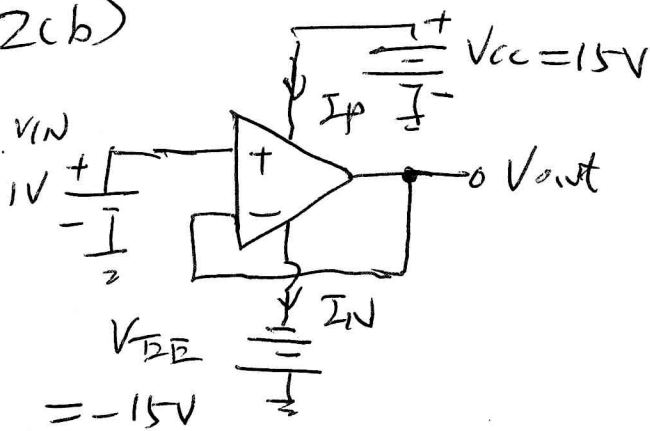
$$R_{in2} = \frac{V_2}{I_2} =$$

$$V_{out} = V_{out1} + V_{out2} =$$

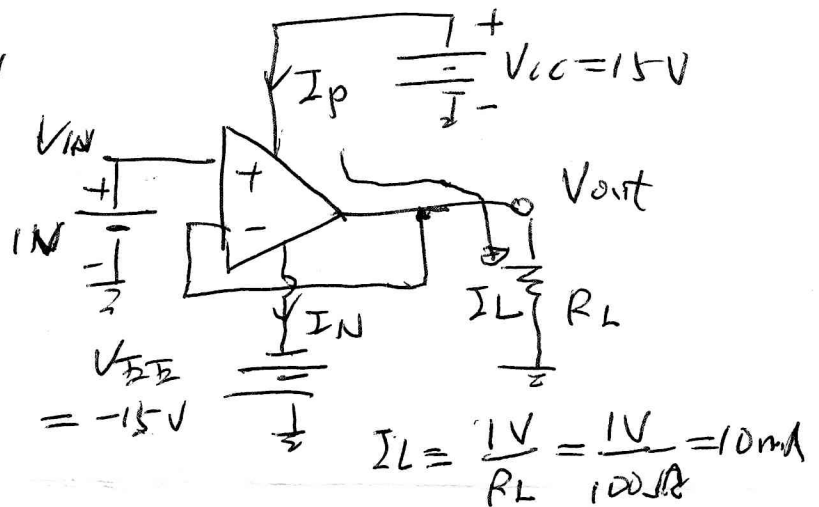
2(a)



2(b)



$$I_p = I_N$$

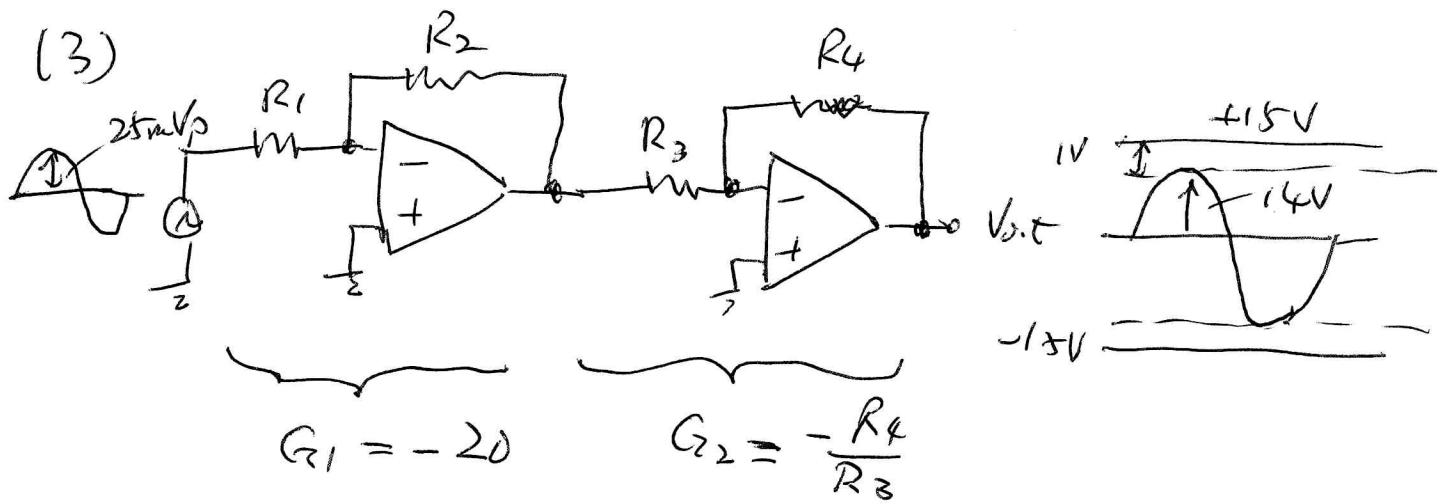


$$I_p = I_L + I_N$$

$$\Rightarrow \Delta I_p = I_p - I_N = \underline{\underline{10\text{mA}}}$$

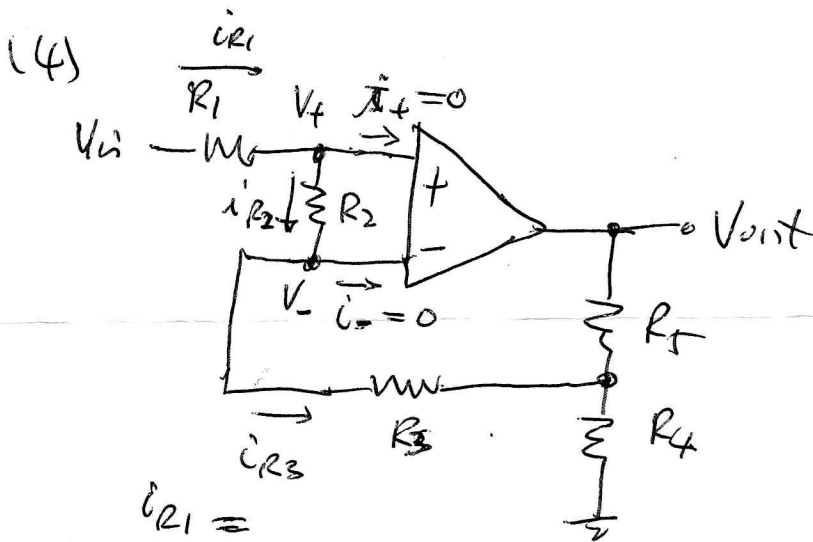
2(c) $\Delta P_{VEE} =$

$$\begin{aligned} \Delta P_{VCC} &= V_{CC} \times \Delta I_p \\ &= 15\text{V} \times 10\text{mA} \\ &= \underline{\underline{150\text{mW}}} \end{aligned}$$



$$V_{out,p} = G_1 \times G_2 \times (25mV_p) \leq 14V$$

$$\therefore |G_2|_{\max} = \frac{14V}{|G_1| \cdot 25mV_p} =$$

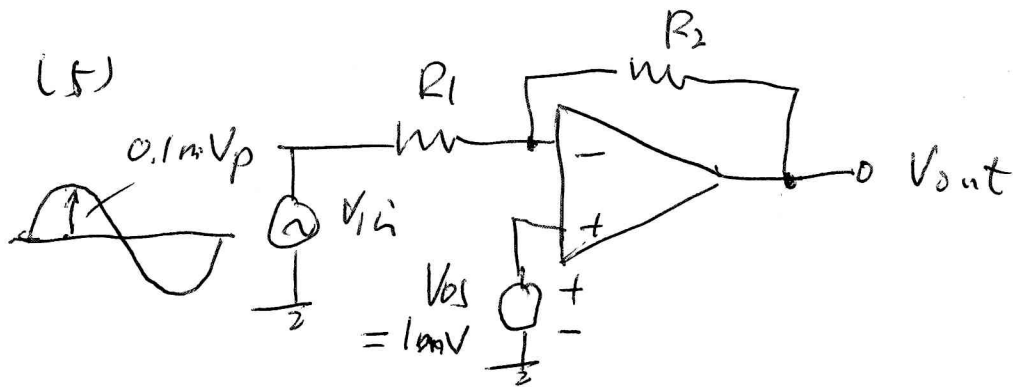


$$i_{R1} =$$

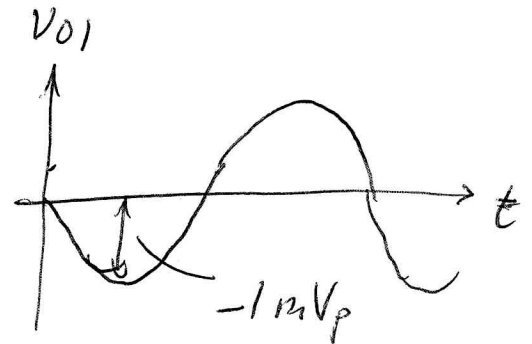
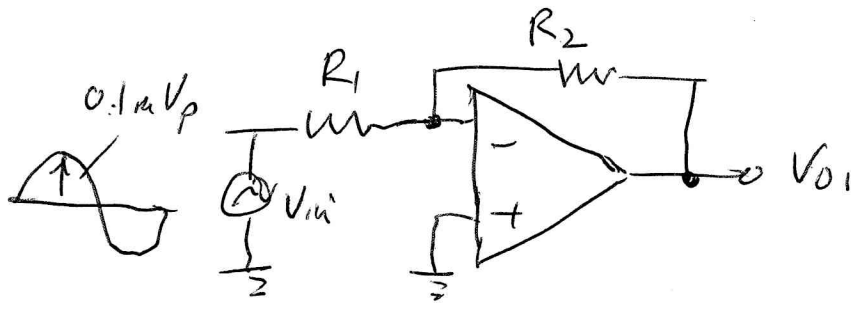
$$i_{R2} =$$

$$i_{R3} =$$

$$V_{out} =$$

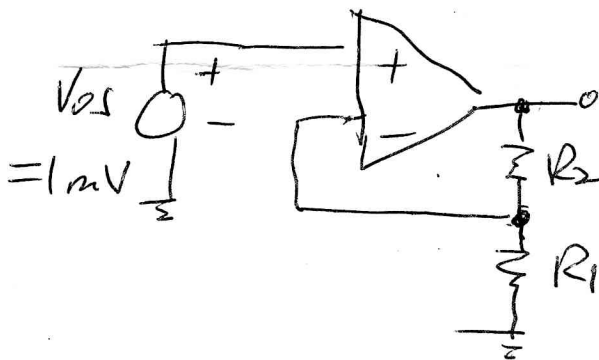


$$G = -10$$



$$V_{o1} = -0.1 \text{ mV}_{\text{stant mV}} \times G$$

$$= -1 \text{ mV}_{\text{stant mV}}$$



$$V_{o2} = V_{os} \times \left(1 + \frac{R_2}{R_1}\right)$$

$$= 11 \text{ mV}$$

$$\therefore V_{out} = V_{o1} + V_{o2}$$

