EE 34

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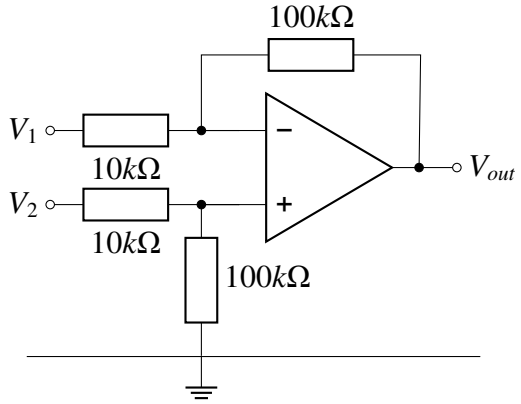
QUESTION: In the circuit below,operational amplifier is ideal .If V_1 is 10mV and V_2 is 50mV the output voltage (V_{out}) is



1) 100mV
2) 400mV
3) 500mV
4) 600mV

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Solution: Let V_3,V_4 be values of voltages negative and positive terminal respectively
For an ideal operational amplifier $V_3 = V_4$

$$V_4 = 0 + (V_2 - 0)\left(\frac{R_1}{R_1 + R_2}\right)$$

$$V_4 = \frac{R_1 V_2}{R_1 + R_2}$$

$$V_3 = V_{out} + (V_1 - V_{out})\left(\frac{R_1}{R_1 + R_2}\right)$$

$$V_3 = \frac{10V_1 - V_{out}}{11}$$

$$\implies \frac{R_1 V_1 - V_{out} R_2}{R_1 + R_2} = \frac{R_1 v_2}{R_1 + R_2}$$

$$V_{out} = (V_2 - V_1)\frac{R_1}{R_2}$$

$$V_{out} = (50 - 10)\frac{100}{10}$$

$$= 400mV$$