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P1)

$$\frac{V_{in}}{2k\Omega} = \frac{0 - V_{out}}{12k\Omega} \rightarrow V_{out} = -6 V_{in}$$

$$V_{out} = -6 \cdot (-1) = 6V$$

P2)

$$V_{out} = -6 \cdot (-4) = 24V > V_{cc} \rightarrow \text{Saturation}$$

$$V_{out} = 10V$$

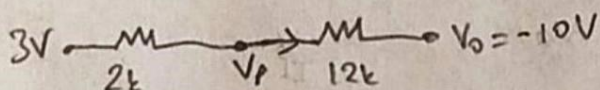P3)

$$I_{0} = \frac{V_{out} - V_{in}}{R_F} = \frac{10V - (-4)}{12k} = 1.16 \text{ mA}$$

P4) $V_{out} = -6 \cdot 3V = -18V < -V_{EE} \rightarrow$ Saturation

$$V_{out} = -10V$$

3V —M—→M—• $V_0 = -10V$ $I = \frac{3 + 10}{14k} = 0.93$ mA
   2k V_p 12k

$$V_p = 3 - 2 \cdot 0.93 = 1.14V$$

P5) $V_P = V_N = \frac{V_{in}}{2}$

$$\frac{V_{in} - \frac{V_{in}}{2}}{1X} = \frac{V_{out} - V_{in}/2}{9X} \rightarrow \frac{9V_{in}}{2} = V_{out} - \frac{V_{in}}{2}$$

$$V_{out} = 5 V_{in} \quad (\text{When diode is in cut-off})$$