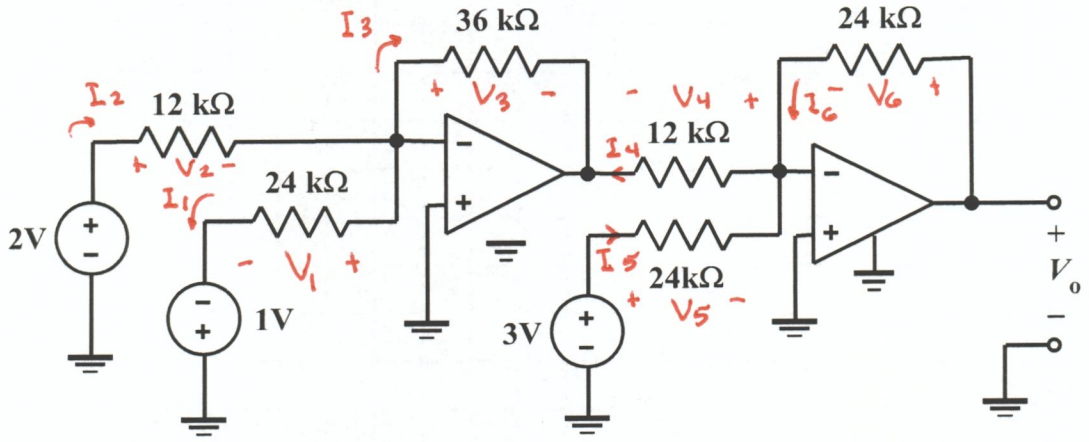
EE 2240

Problem #09

Determine the output voltage V_o of the op-amp circuit shown.



$V_1 = 1V \Rightarrow I_1 = \frac{V_1}{24k\Omega} = \frac{1}{24}\ mA$

$V_2 = 2V \Rightarrow I_2 = \frac{V_2}{12k\Omega} = \frac{1}{6}\ mA$

$I_3 = I_2 - I_1 = \frac{1}{6}\ mA - \frac{1}{24}\ mA = \frac{1}{8}\ mA$

$V_3 = (36k\Omega)\, I_3 = (36k\Omega)(\frac{1}{8}\ mA) = 4.5\ V$

$V_4 = V_3$

$I_4 = \frac{V_4}{12k\Omega} = \frac{4.5V}{12k\Omega} = \frac{3}{8}\ mA$

$V_5 = 3V$

$I_5 = \frac{V_5}{24k\Omega} = \frac{3V}{24k\Omega} = \frac{1}{8}\ mA$

$I_6 = I_4 - I_5 = \frac{3}{8}\ mA - \frac{1}{8}\ mA = \frac{1}{4}\ mA$

$V_6 = (24k\Omega)\, I_6 = (24k\Omega)(\frac{1}{4}\ mA) = 6\ V$