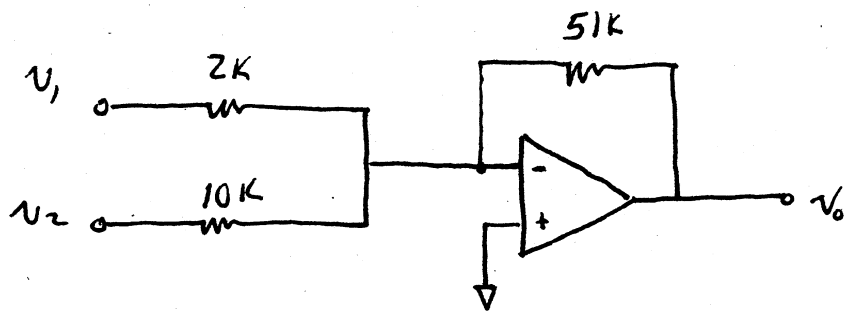
GIVEN :



$v_1 = 10 \sin(\omega_1 t)$ mV

$v_2 = 50 \sin(\omega_2 t)$ mV

FIND : v_o & v_-

SOLN : $v_o = -\frac{51}{2} v_1 + \frac{-51}{10} v_2$

$= \underline{\underline{-255 \sin(\omega_1 t)}} - \underline{\underline{255 \sin(\omega_2 t)}}$ mV

$v_- = \underline{\underline{0 \text{ V}}}$

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GIVEN: AMP OF PROB 43 WITH

$$v_i = 500 \sin(2500\pi t) + 750 \cos(8000\pi t) + 600 \cos(12000\pi t) \text{ mV}$$

FIND: v_o

SOLN: REMEMBER $\omega = 2\pi f$ ... SO, LET'S CONSIDER THE INDIVIDUAL CONTRIBUTIONS OF v_i TO v_o ONE AT A TIME (SUPER POSITION!)

THE 2500π COMPONENT HAS $f = 1250$ AND EXPERIENCES A GAIN OF 20 ...

LIKEWISE, THE 8000π COMPONENT HAS $f = 4000$ AND GETS A GAIN OF 20 ...

BUT THE 12000π COMPONENT HAS $f = 6000$ AND GETS A GAIN OF 0!

SO, $v_o = 10 \sin(2500\pi t) + 15 \cos(8000\pi t)$ V

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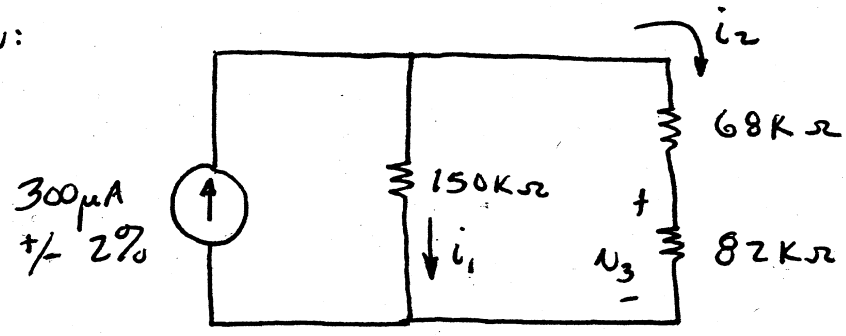
GIVEN:



+/- 5% ON R_s

FIND: WORST-CASE VALUES FOR i_1, i_2 & v_3

SOLN: FOR i_1^{MAX} ... $i_s = 306\mu A$,

$R_1 = 142.5K\Omega$, $R_2 = 71.4K\Omega$, $R_3 = 86.1K\Omega$

BY CURRENT DIVISION:

$$\underline{\underline{i_1^{MAX}}} = 306\mu \left(\frac{71.4 + 86.1}{142.5 + 71.4 + 86.1}\right) = \underline{\underline{160.6\mu A}}$$

i_1^{MIN} ... $i_s = 294\mu A$, $R_1 = 157.5K\Omega$, $R_2 = 64.6K\Omega$, $R_3 = 77.9$

$$\underline{\underline{i_1^{MIN}}} = \underline{\underline{139.6\mu A}}$$

i_2^{MAX}: $i_s = 306\mu A$ $R_1 = 157.5K\Omega$, $R_2 = 64.6K\Omega$, $R_3 = 77.9K\Omega$

$$i_2^{MAX} = 160.6\mu A$$

i_2^{MIN}: $i_s = 294\mu A$ $R_1 = 142.5K\Omega$, $R_2 = 71.4K\Omega$, $R_3 = 86.1K\Omega$

$$i_2^{MIN} = 139.6\mu A$$

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FOR V_3^{MAX}: CONSIDER @ i_2^{MAX} ... $V_3 = 160.6\mu(77.9K)$
$= 12.51\ V$

AND @ i_2^{MIN} ... $V_3 = 139.6\mu(86.1K)$
$= 12.02V$

BUT... WE COULD HAVE... $i_s = 306\mu A$, $R_1 = 157.5\ K\Omega$

$R_2 = 64.6K\Omega$ AND $R_3 = 86.1K\Omega$

WHICH YIELDS $i_2 = 156.4\ \mu A$

FOR WHICH $V_3 = 156.4\mu(86.1K) = \underline{\underline{13.5V}}$

SIMILARLY, FOR V_3^{MIN} ... $i_s = 294\mu A$ $R_1 = 142.5K\Omega$

$R_2 = 71.4K\Omega$ $R_3 = 77.9K\Omega$

AND $i_2 = 143.6\mu A$

$V_3 = 143.6\mu(77.9K) = \underline{\underline{11.2V}}$

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