ECE 376 Homework 3 Solutions

H3.1

CONSISTENT UNITS V-mA-K-mW

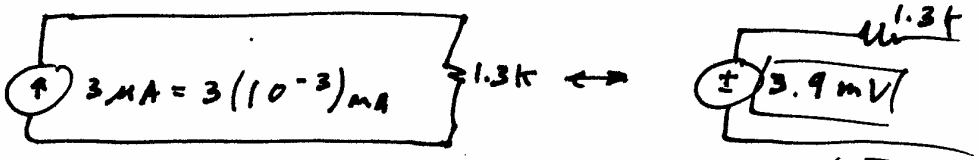
6.14 $\frac{v_{out}^2}{10K} = 150mW$ $\quad v_{out} = \sqrt{1500} = \boxed{38.73\ V}$

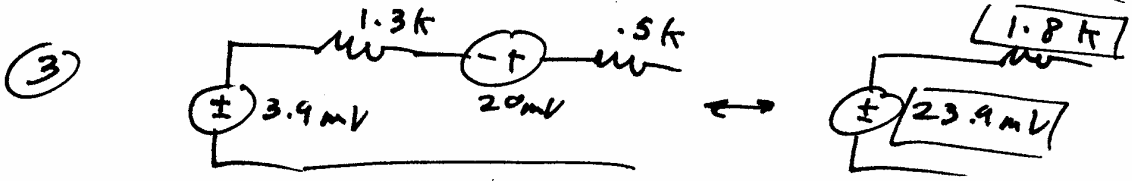
NON-INVERTING AMP: $v_{out} = \left(1 + \frac{1K}{R}\right)5$

$\frac{38.73}{5} - 1 = \frac{1}{R}$ $\quad R = \boxed{.1482\ K}$

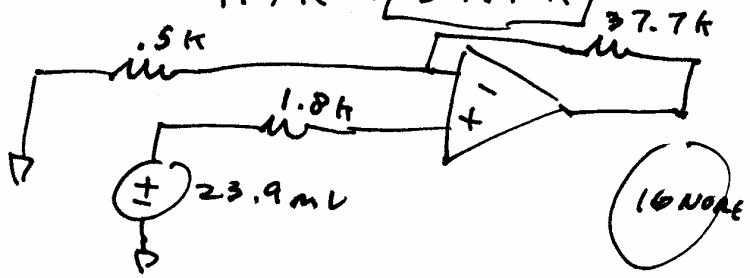
6.26 SIMPLIFICATIONS

(1) $4.7M \,||\, (1K + 300\Omega) = 4700 \,||\, 1.3 = \boxed{1.3\ K}$ TO 3 SIG FIGS

(2) 

(3) 

(4) $33K + 4.7K = \boxed{37.7\ K}$

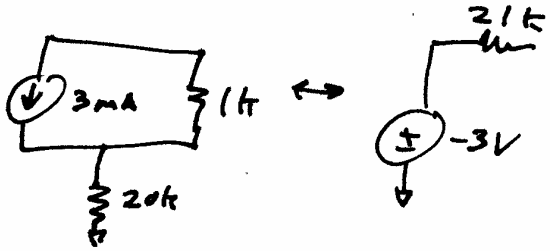
(5) 

NON-INVERTING

$v_{out} = \left(1 + \frac{37.7}{.5}\right) 23.9mV = \boxed{1.826\ V}$

6.28 SOURCE TRANSFORM

2 INVERTING AMPS



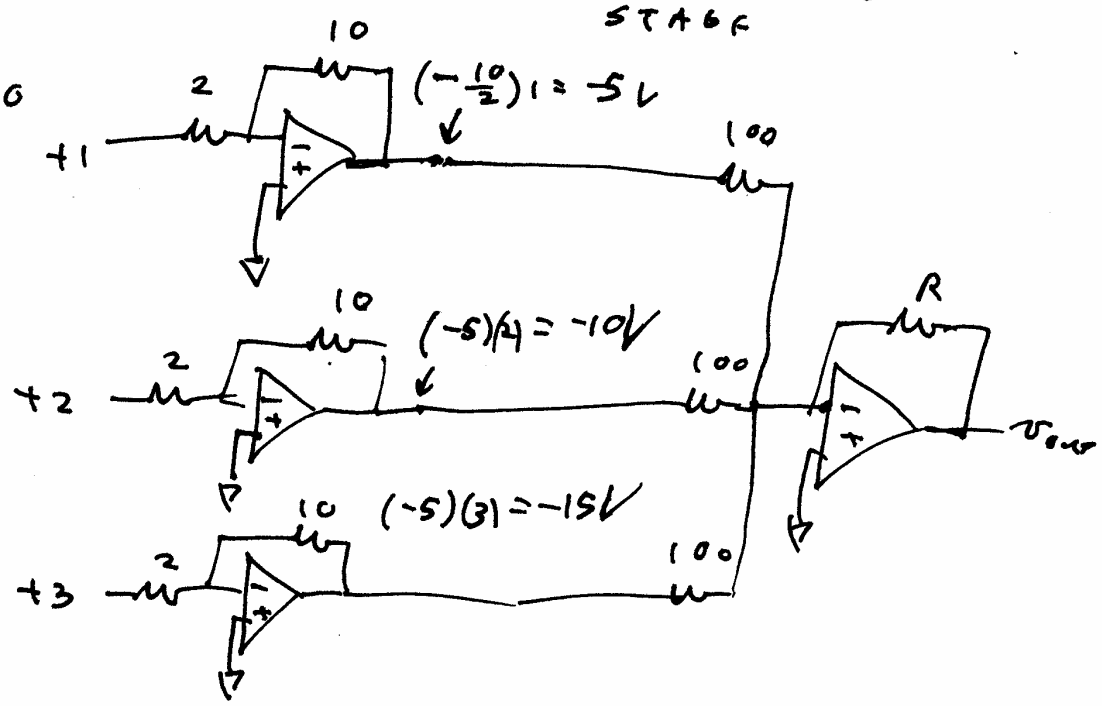
$v_x = -\frac{100}{21}(-3) - \left(\frac{-100}{10}\right)5$

$= \boxed{64.29\ V}$

H 3.2

6.37 $v_{out} = \underbrace{(1V)}_{\text{INPUT}} \underbrace{\left(-\frac{20}{2}\right)}_{\text{1ST INVERTING STAGE}} \underbrace{\left(-\frac{1}{10}\right)}_{\text{2ND INVERTING STAGE}} = \boxed{1\,V}$

6.40



SUPERPOSITION $v_{out} = \frac{-R}{100}(-5) + \frac{-R}{100}(-10) + \frac{-R}{100}(-15)$

$v_{out} = R\,(5+10+15)/100 = R\frac{30}{100} = 10V$

$R = \frac{100 \cdot 10}{30} = \frac{1000}{30} = \boxed{33.3\,\Omega}$