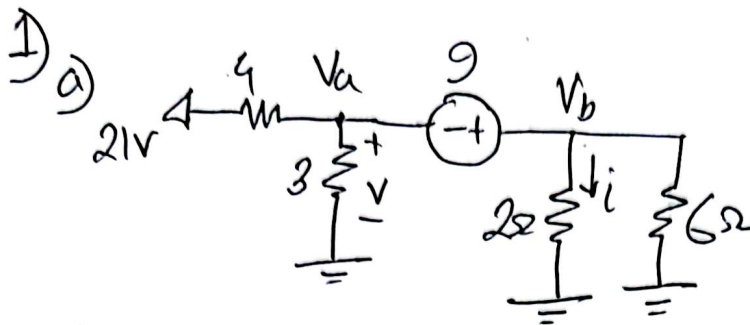


CSE251 Assignment [Solution]



b) KCL at Super Node

$$\frac{V_a - 21}{4} + \frac{V_a}{3} + \frac{V_b}{2} + \frac{V_b}{6}$$

$$\Rightarrow 7V_a + 8V_b = 63 \quad \text{--- (i)}$$

$$V_a - V_b = -9 \quad \text{--- (ii)}$$

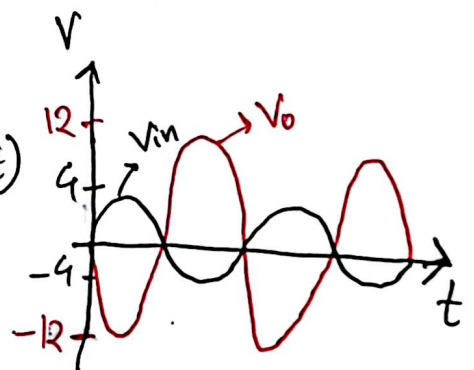
Solving eqn (i) & (ii)

$$V_a = -0.6V \quad V_b = 8.4V$$

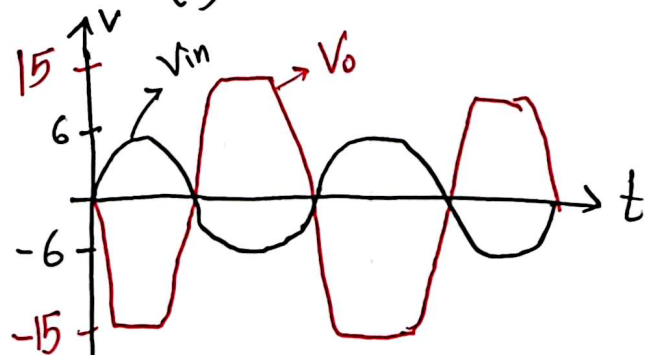
$$\therefore \boxed{V = -0.6V} \quad i = \frac{V_b - 0}{2} = \frac{8.4}{2} = 4.2A$$

2) a) $V_o = -\frac{6}{2} \times 4 = \boxed{-12V}$

b) $V_o = -\frac{6}{2} (4 \sin(\omega t)) = -12 \sin(\omega t)$



c) $V_o = -\frac{6}{2} \{6 \sin(\omega t)\} = -18 \sin(\omega t)$



1 C)

Extra

find i_n

$$i_1 = \frac{24 - (-8)}{4} = 8A$$

KCL at a

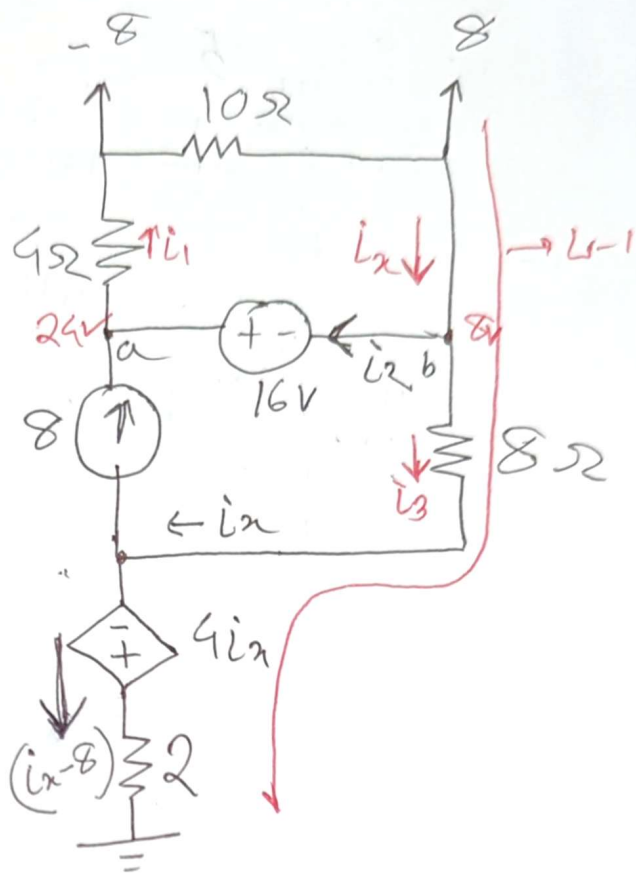
$$8 + i_2 = i_1$$

$$\Rightarrow i_2 = 0A$$

KCL at Node b

$$i_n = i_2 + i_3$$

$$\Rightarrow i_n = i_3$$



KVL at L-1

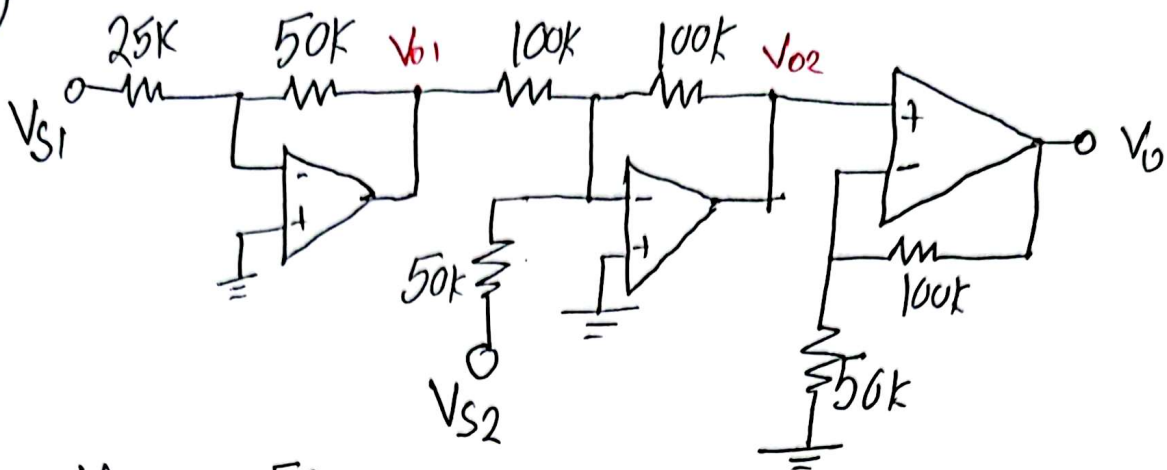
$$8 = 8i_n - 4i_n + 2(i_n - 8)$$

$$\Rightarrow 8 = 8i_n - 4i_n + 2i_n - 16$$

$$\Rightarrow 6i_n = 24$$

$$\Rightarrow i_n = 4A$$

3)



$$V_{b1} = -\frac{50}{25} V_{s1} = -2V_{s1}$$

$$V_{b2} = -\frac{100}{100} V_{b1} - \frac{100}{50} V_{s2} \\ = 2V_{s1} - 2V_{s2}$$

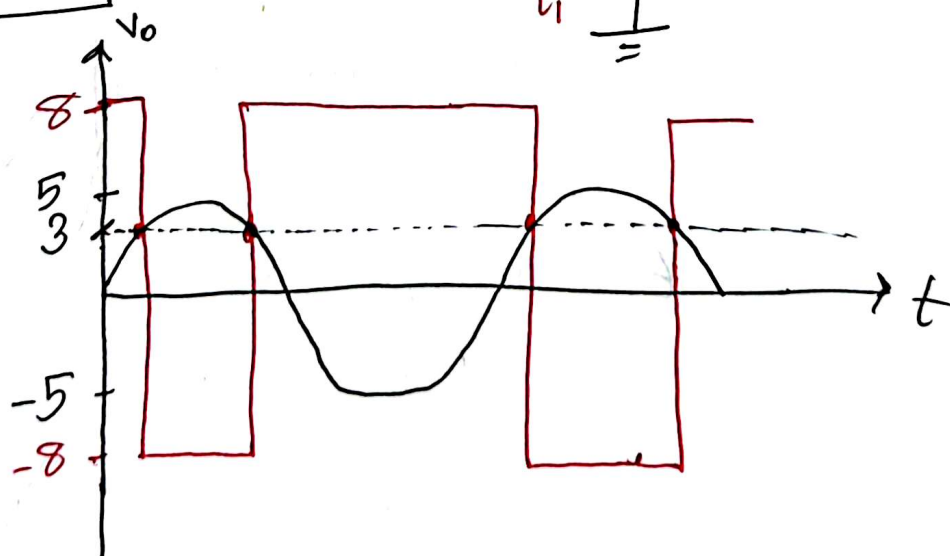
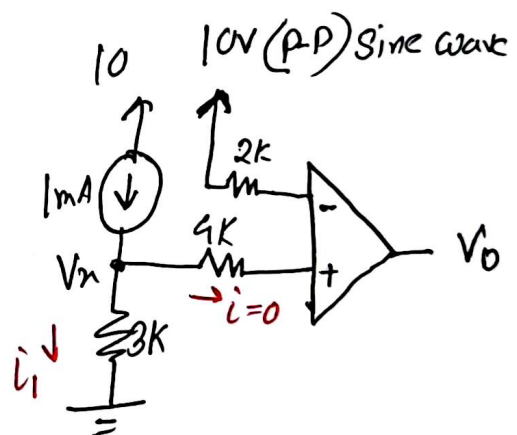
$$V_o = \left(1 + \frac{100}{50}\right) V_{b2} = 3(2V_{s1} - 2V_{s2})$$

$$\boxed{V_o = 6V_{s1} - 6V_{s2}}$$

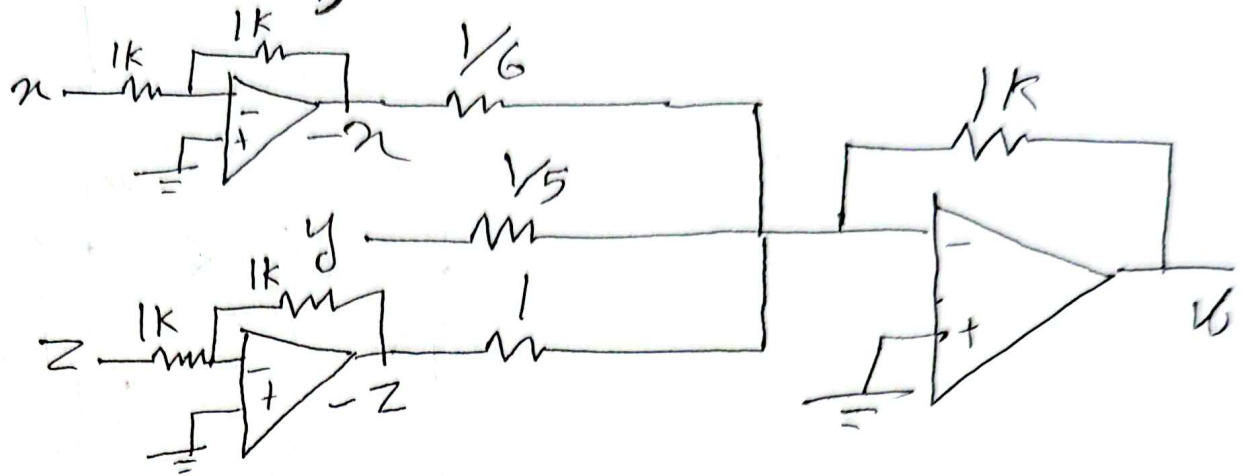
4) KCL at Node V_x

$$1 = i_1 \\ \Rightarrow 1 = \frac{V_x - 0}{3}$$

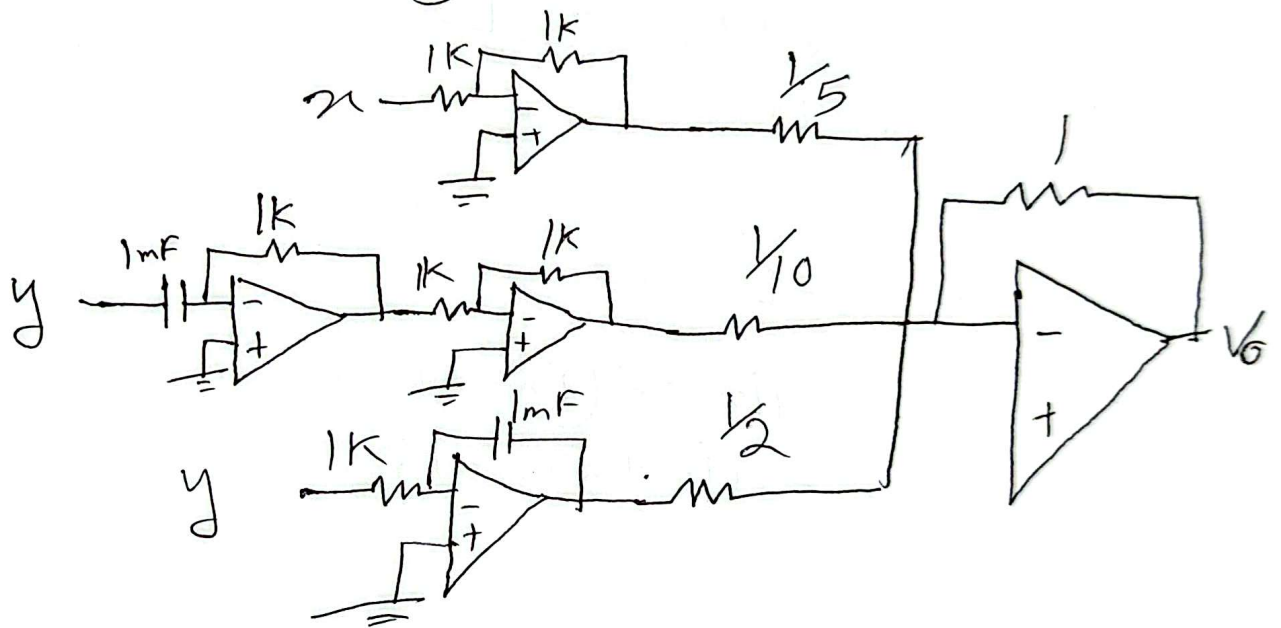
$$\therefore \boxed{V_x = 3V}$$



Q5) a) $f = 6x - 5y + z$
 $= \frac{1}{6}x - \frac{1}{5}y + z$



b) $f = 5x - 10 \frac{dy}{dt} + 2 \int z dt$

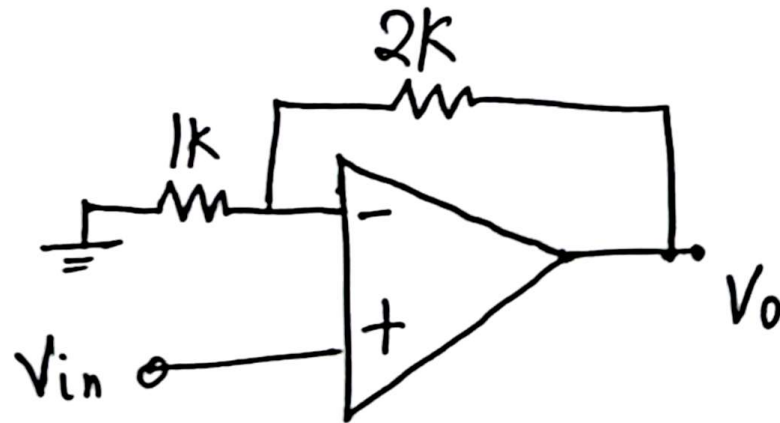
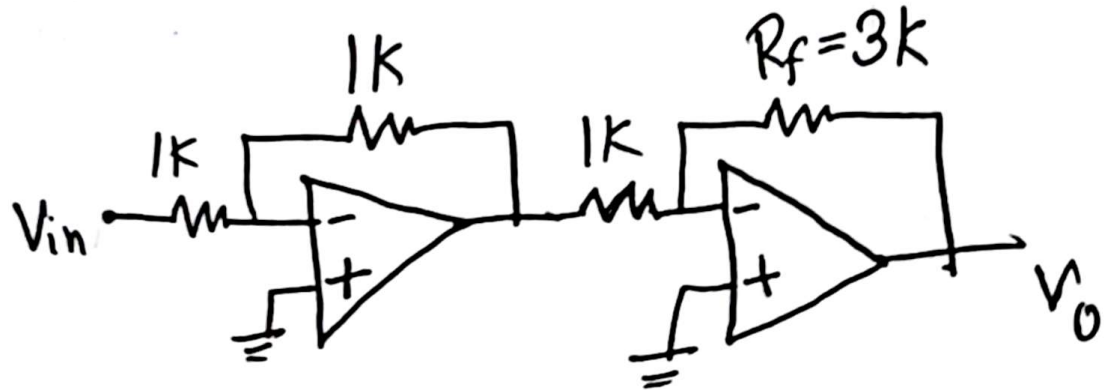


7) a) $\text{gain} = \frac{15}{5} = 3$

b) $\text{gain} = \frac{15}{5} = 3$

$$\left(1 + \frac{R_f}{R_i}\right) = 3$$

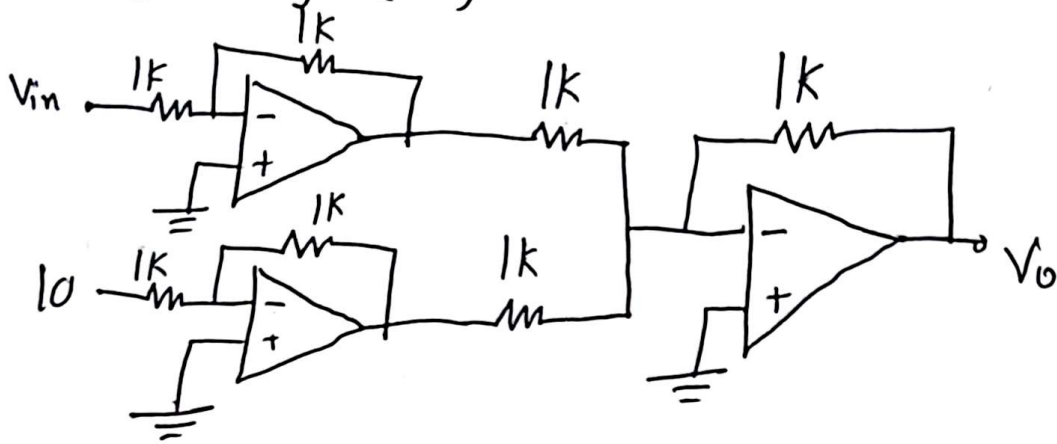
$$\Rightarrow \frac{R_f}{R_i} = 2$$



8) V_{in} is shifted by 10v

$$V_o = 5\sin(t) + 10$$

$$= -\{-5\sin(t)\} - \{-10\}$$



6)

$$\frac{V_i - 3}{3 - 1} = \frac{V_o - 9}{9 - 3}$$

$$\Rightarrow V_{in} - 3 = \frac{V_o - 9}{3}$$

$$\Rightarrow 3V_{in} - 9 = V_o - 9$$

$$\Rightarrow V_o = 3V_{in} ; \text{gain} = 3$$

Non inverting Amplifier

$$\left(1 + \frac{R_f}{R_i}\right) = 3$$

$$\Rightarrow \frac{R_f}{R_i} = 2$$

$$R_f = 2k$$

$$R_i = 1k$$

$$V_s^+ = 9v$$

$$V_s^- = 3v$$

