EEEB273/EEEB2014 - Quiz 5
SEMESTER 2, ACADEMIC YEAR 2018/2019
Date: 24 January 2019   .
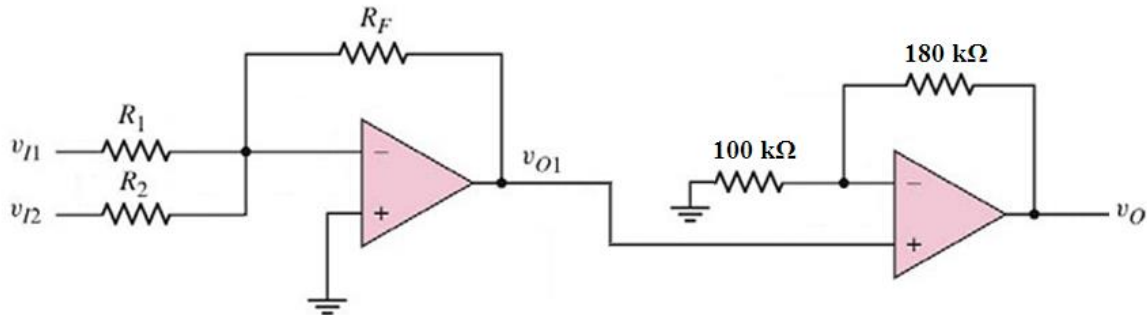
Question:

Figure 1

Refer to **Figure 1**. Given that $R_1 = 12$ **kΩ**, $R_2 = 20$ **kΩ**, and $R_F = 24$ **kΩ**. Using ideal properties of the op-amps:

    (a) Determine v_{O1} when $v_{I1} = 15$ **mV** and $v_{I2} = -20$ **mV**.   **[6 marks]**
    (b) Find v_O.   **[4 marks]**
Show clearly all calculations in order to get full marks.

Answers:

(a)
Inverting summing amp:

v_{O1} $= - [(R_F / R_1)(v_{I1}) + (R_F / R_2)(v_{I2})]$ **[3]**
              $= - [(24k/12k)(15m) + (24k/20k)(-20m)]$ $= - [30m - 24m]$ **[2]**
              $= - 6$ **mV**   **[1]**

(b)
Non-inverting amp:

v_O $= (1 + 180k/100k)(v_{O1})$ **[2]**
              $= (1 + 180k/100k)(-6m)$ $= -16.8$ **mV**   **[2]**

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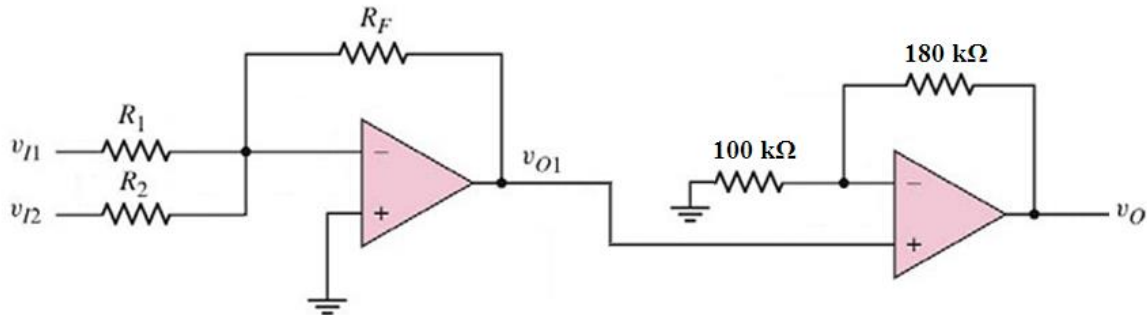**Figure 1**

Refer to **Figure 1**. Given that $R_1 = 12$ kΩ, $R_2 = 20$ kΩ, and $R_F = 24$ kΩ. Using ideal properties of the op-amps:

    (a) Determine v_{O1} when $v_{I1} = -15$ mV and $v_{I2} = +20$ mV.   **[6 marks]**
    (b) Find v_O.   **[4 marks]**

Show clearly all calculations in order to get full marks.

Answers:

(a)
Inverting summing amp:

v_{O1}	$= -[\,(R_F/R_1)(v_{I1}) + (R_F/R_2)(v_{I2})\,]$		**[3]**
	$= -[\,(24k/12k)(-15m) + (24k/20k)(20m)\,]$	$= -[\,-30m + 24m\,]$	**[2]**
	$= 6$ mV		**[1]**

(b)
Non-inverting amp:

v_O	$= (1 + 180k/100k)(v_{O1})$		**[2]**
	$= (1 + 180k/100k)(6m)$	$= 16.8$ mV	**[2]**

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Question:

Figure 1

Refer to **Figure 1**. Given that $R_1 = 24$ kΩ, $R_2 = 20$ kΩ, and $R_F = 24$ kΩ. Using ideal properties of the op-amps:

    (a) Determine v_{O1} when $v_{I1} = $ **-15 mV** and $v_{I2} = $ **20 mV**.   **[6 marks]**
    (b) Find v_O.   **[4 marks]**
Show clearly all calculations in order to get full marks.

Answers:

(a)
Inverting summing amp:

v_{O1}
       $= - [(R_F / R_1)(v_{I1}) + (R_F / R_2)(v_{I2})]$ **[3]**
       $= - [(24k/24k)(-15m) + (24k/20k)(20m)]$ $= - [-15m + 24m]$ **[2]**
       $= - 9$ **mV**   **[1]**

(b)
Non-inverting amp:

v_O
       $= (1 + 180k/100k)(v_{O1})$ **[2]**
       $= (1 + 180k/100k)(-9m)$ $= -25.2$ **mV**   **[2]**

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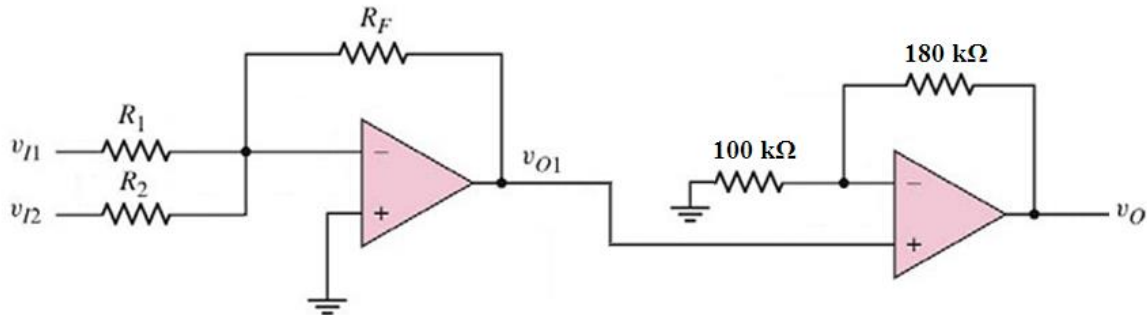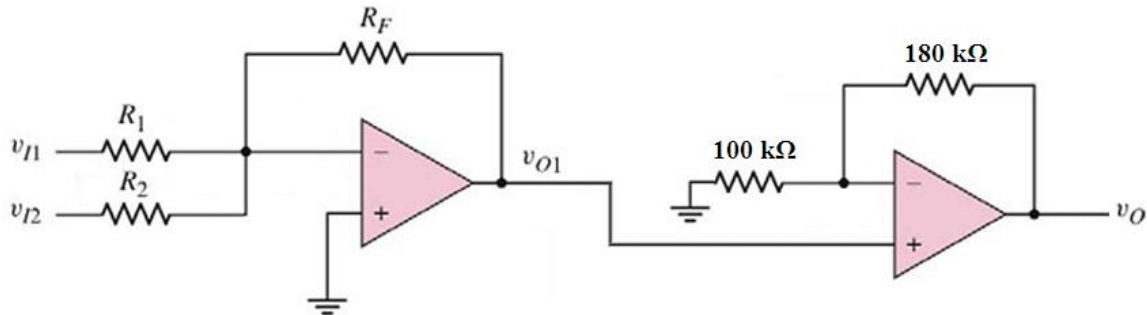**Figure 1**

Refer to **Figure 1**. Given that $R_1 = 24$ kΩ, $R_2 = 20$ kΩ, and $R_F = 24$ kΩ. Using ideal properties of the op-amps:

   (a) Determine v_{O1} when $v_{I1} = 15$ mV and $v_{I2} = -20$ mV.   **[6 marks]**
   (b) Find v_O.   **[4 marks]**
Show clearly all calculations in order to get full marks.

Answers:

(a)
Inverting summing amp:
v_{O1} $= - [(R_F / R_1)(v_{I1}) + (R_F / R_2)(v_{I2})]$ **[3]**
           $= - [(24k/24k)(15m) + (24k/20k)(-20m)]$ $= - [15m - 24m]$ **[2]**
           $= 9$ **mV**   **[1]**

(b)
Non-inverting amp:
v_O $= (1 + 180k/100k)(v_{O1})$ **[2]**
           $= (1 + 180k/100k)(9m)$ $= 25.2$ **mV**   **[2]**