SANTA CLARA UNIVERSITY	ELEN 115 – Spring 2023	S. Krishnan
Homework #3 – Operational Amplifier circuits		

1.

The amplifier circuit below employs an ideal opamp

(a) Derive the expressions for

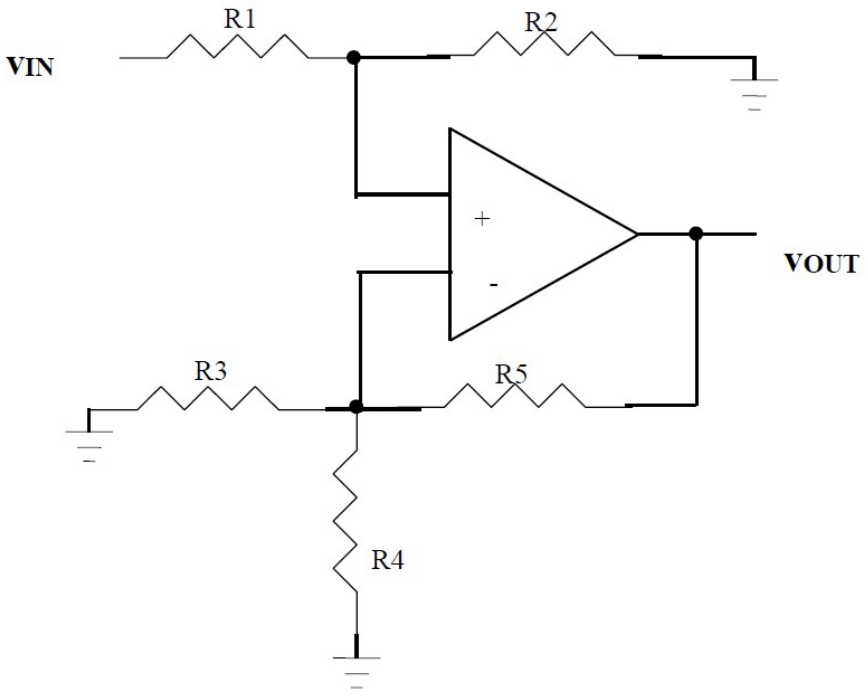
(i) v_{OUT}/v_{IN}

(ii) the input resistance, R_{in}, seen by v_{IN}

(b) Given that R1 = 5KΩ R2 = 10KΩ R3= 6KΩ R4= 3KΩ R5 = 4KΩ

For input $v_{IN}(t) = 2\sin 2\pi t$, draw $v_{IN}(t)$ and the corresponding $v_{OUT}(t)$.

Clearly indicate all values and label all axes and graphs



2. 2.72 (2.71 in 7th edition)

3. The circuit in Figure 2 employs an ideal operational amplifier.

(a) Find the input resistance, R_{in}

(i) at DC and (ii) at very high frequencies

(b) Find the gain v_{OUT}/v_{IN}

(i) at DC and (ii) at very high frequencies

(c) Considering that this circuit has a capacitor and therefore changes its behavior with frequency

(i) What is the equivalent resistance seen by the capacitor?

(ii) What is the frequency at which this circuit sees a change in gain?

(d) Given that $R_1 = 1K\Omega$, $R_2 = 500\Omega$ and $C = 1\mu F$.

Also given the opamp has **saturation voltages** of **± 5V** draw both the input voltage $v_{IN}(t)$ and the corresponding $v_{OUT}(t)$ for

(i) $v_{IN}(t) = 2 + 5\sin 2\pi t$

(ii) $v_{IN}(t) = 2 + 6\sin(2\pi 10^9)t$

Clearly indicate all values and label all axes of the plot.

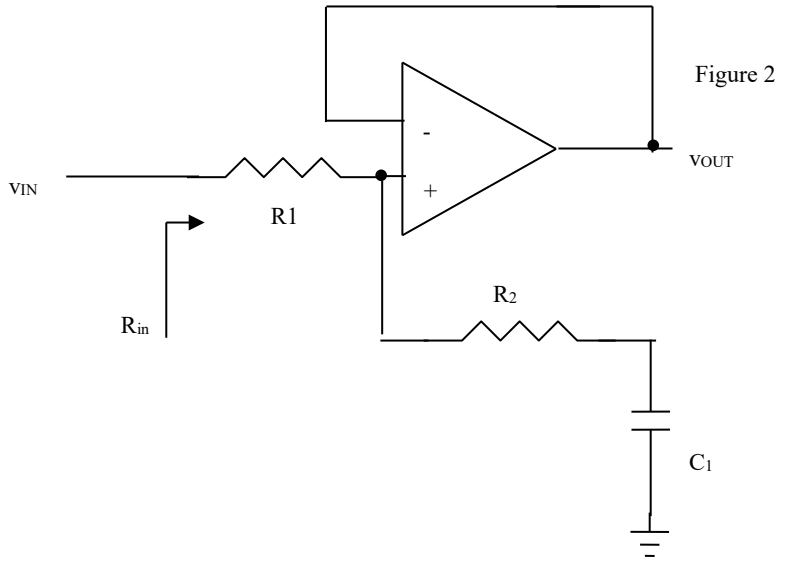


Figure 2