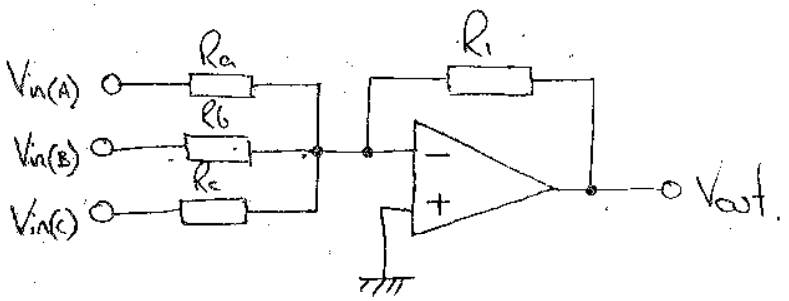
Summing Amplifier



$V = IR$

$\frac{V}{I} = R$

$\frac{V}{R} = I$

$I_{Ra} = \frac{V_{in(A)}}{Ra}$

$I_{RB} = \frac{V_{in(B)}}{RB}$

$I_{Rc} = \frac{V_{in(C)}}{Rc}$

$V_{out} = R_1 (I_{Ra} + I_{RB} + I_{Rc})$

$V_{out} = R_1 \left(\frac{V_{in(A)}}{Ra} + \frac{V_{in(B)}}{RB} + \frac{V_{in(C)}}{Rc} \right)$ ⇐

The only way to express the actual gain is to make each of the inputs the same. By doing so, we can resolve the following relationship;

$V_{out} = R_1 (A)$

$A = \frac{V_{in(A)}}{Ra} + \frac{V_{in(B)}}{RB} + \frac{V_{in(C)}}{Rc}$

$= \frac{V_{in(A)}.RB.Rc + V_{in(B)}.Ra.Rc + V_{in(C)}.RaRB}{Ra.RB.Rc}$

If $V_{in(A)} = V_{in(B)} = V_{in(C)} = V_{in}$. then;

$A = \frac{V_{in}(RB.Rc + Ra.Rc + RaRB)}{Ra.RB.Rc}$

$V_{out} = \frac{R_1 V_{in}(RB.Rc + RaRc + RaRB)}{Ra.RB.Rc}$

$\frac{V_{out}}{V_{in}} = \frac{R_1(RBRc + RaRc + RaRB)}{Ra.RB.Rc}$ ⇐