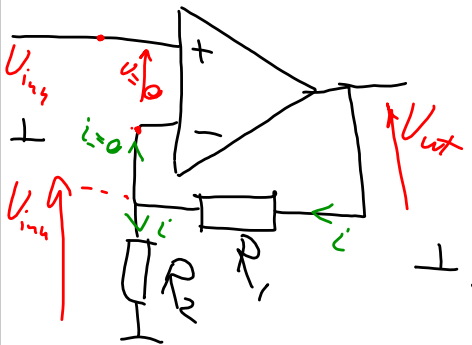
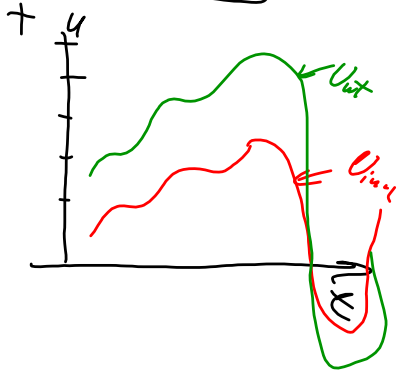
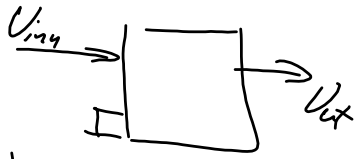


# Ikke invertierende forsterker



$$i = \frac{U_{out}}{R_1 + R_2} \quad U_{in} = i \cdot R_2$$

$$U_{in} = \frac{U_{out}}{R_1 + R_2} \cdot R_2$$

$$\frac{U_{out}}{U_{in}} = \frac{R_1 + R_2}{R_2} = 1 + \frac{R_1}{R_2}$$

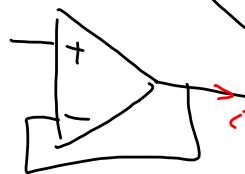
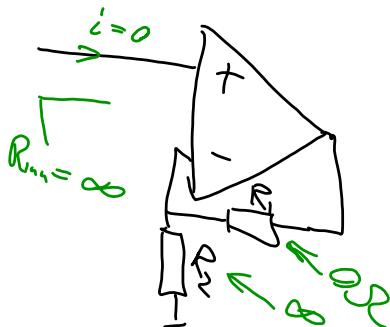
Forsterkning kan ikke bli mindre enn 1

Spesialtilfelle:

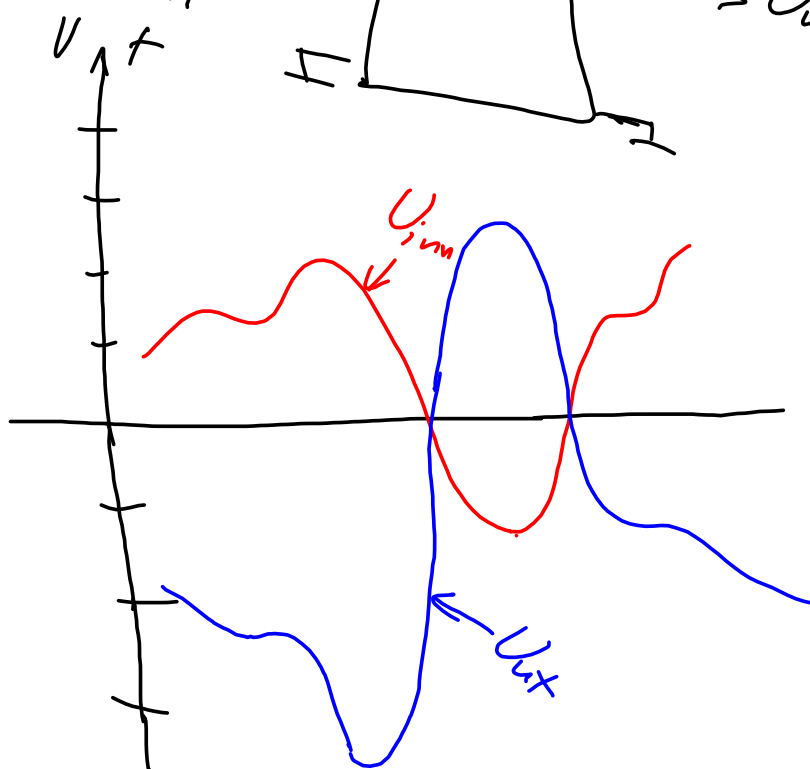
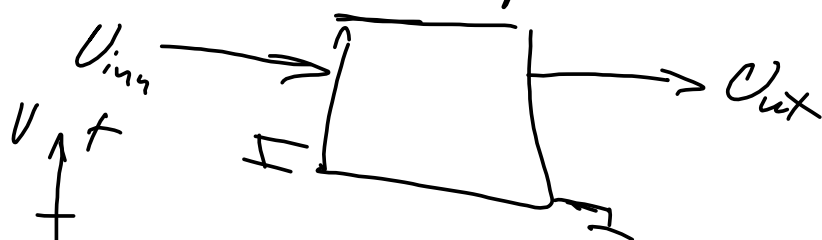
Spenningsfølger: 1 gang forsterkning

$$R_1 = 0 \Omega$$

$$R_2 = \infty \Omega$$



# Inverterende forsterker



$i_I + i_F = 0$   
 $i_I = -i_F$

$i_I = \frac{U_{in}}{R_I}$   
 $i_F = \frac{U_{out}}{R_F}$

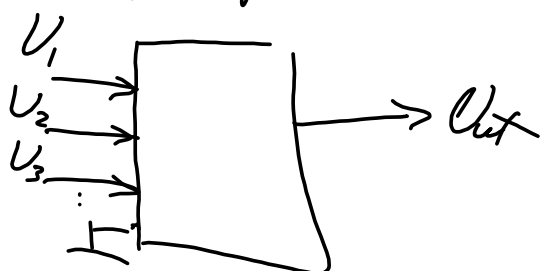
$\frac{U_{in}}{R_I} = - \frac{U_{out}}{R_F}$   
 $\frac{U_{out}}{U_{in}} = - \frac{R_F}{R_I}$

inverterende  
 + in : - ut  
 - in : + ut

alle forsterkninger er mulig

$i_I = -i_F$   
 det går strøm inn!

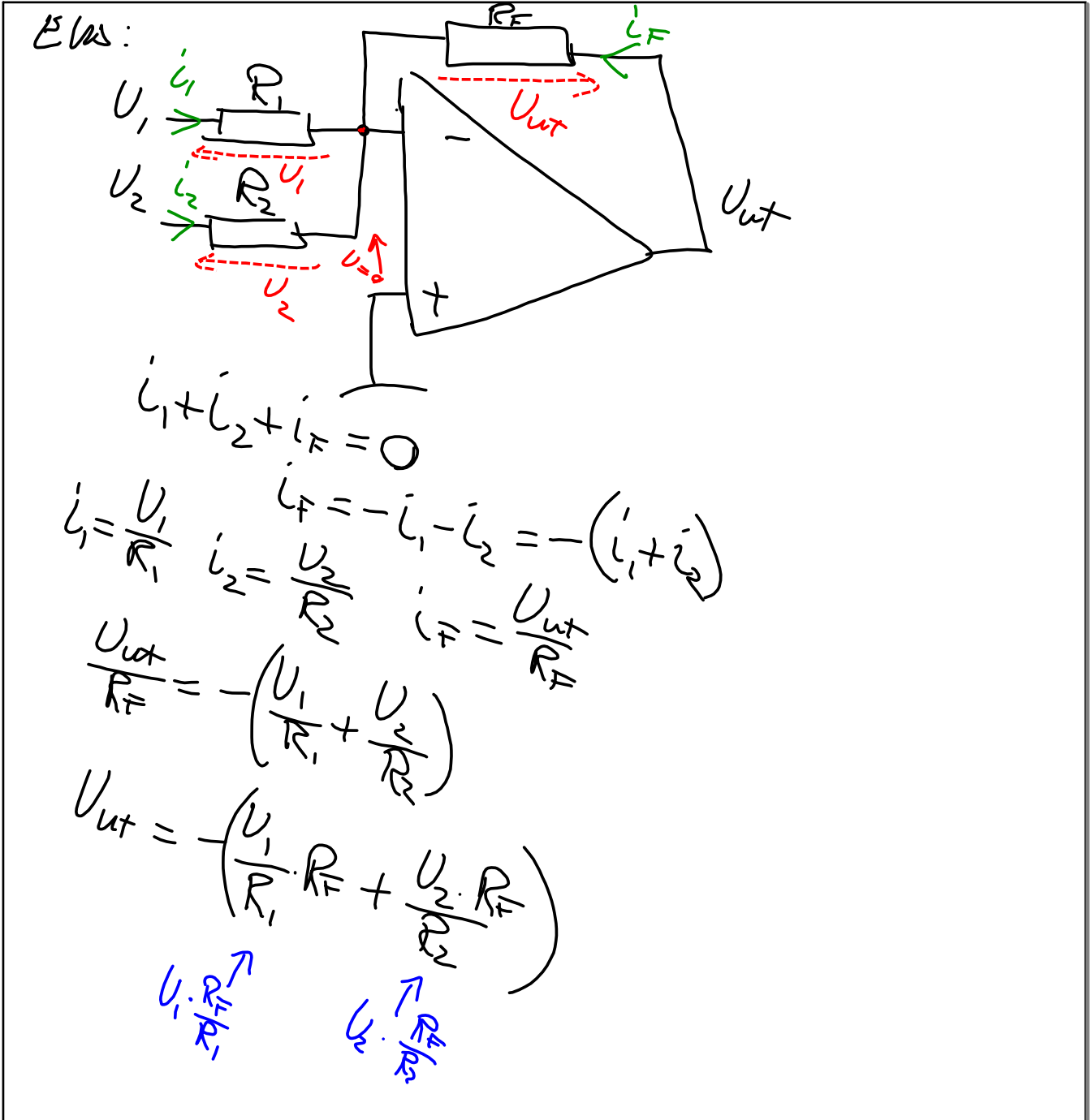
## Summasjonsforsterker



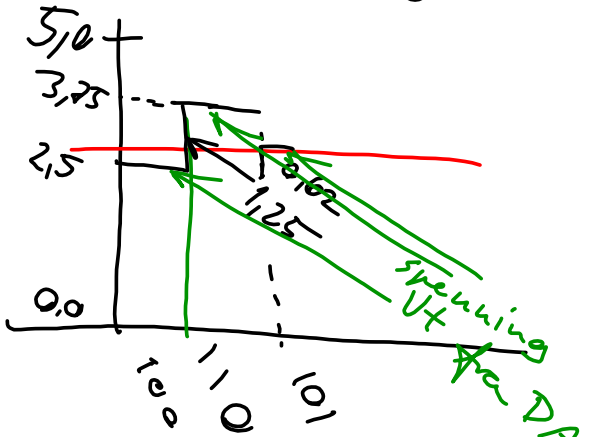
$$U_{ut} = f(\text{Sum av } U_1, \text{ og } U_2, \text{ og } U_3)$$

$$U_{ut} = \dots U_1 + \dots + U_2 + \dots + U_3$$

↑ "Forsterleingsfaktor"



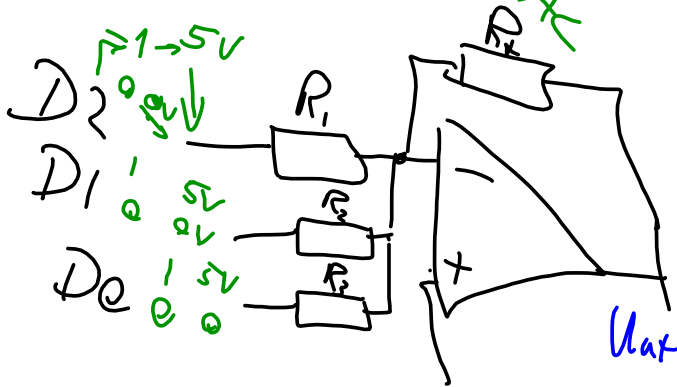
# DAC (Digital til Analog Converter)



0V eller 5V

$$U_{out} = - \left( \frac{D_2}{R_1} \cdot R_F \right)$$

$$\frac{R_F}{R_1} = 0,5$$



$$U_{out} = - \left( \frac{D_2}{R_1} \cdot R_F + \frac{D_1}{R_2} \cdot R_F + \frac{D_0}{R_3} \cdot R_F \right)$$

$D_2: 5V \rightarrow 2.5V$

$$\frac{R_F}{R_1} = 0,5$$

$$\frac{R_F}{R_2} = 0,25$$

$$\frac{R_F}{R_3} = 0,125$$

# Ubalansert målesystem

$V_{in}$  på en inngang + jord  $\rightarrow$  i forhold til jord  $\perp$



Ubalansert forsterker

