```
clear; clc; clearvars;
syms r c Rin Rf ro ri w f positive
```

Definindo as equações:

```
r = sqrt(6)/(w*c*6)
```

r =

$$\frac{\sqrt{6}}{6\,c\,w}$$

```
ZinAmp = Rf
```

ZinAmp = Rf

```
ZoutAmp = (Rf*ro)/(Rf+ro)
```

ZoutAmp =

$$\frac{\mathrm{Rf}\,\mathrm{ro}}{\mathrm{Rf}+\mathrm{ro}}$$

```
ZinRC = (-c^3*r^3*w^3+6*c^2*r^2*w^2*1i+5*c*r*w-1i)/(c*w*(-3*c^2*r^2*w^2+4*c*r*w*1i+1))
```

ZinRC =

$$\frac{29\,\sqrt{6}}{36\,c\,w\left(\frac{1}{2}+\frac{2\,\sqrt{6}\,\mathrm{i}}{3}\right)}$$

```
ZoutRC = r*(2*c*r*w-1i)/(3*c^2*r^2*w^2*1i+6*c*r*w-2*1i)
```

ZoutRC =

$$\frac{\sqrt{6}\,\left(\frac{\sqrt{6}}{3}-\mathrm{i}\right)}{6\,c\,w\left(\sqrt{6}-\frac{3}{2}\,\mathrm{i}\right)}$$

F = 250Hz

Antes de tudo definamos os parâmetros do ampop. Nesse caso o ampop utilizado foi o LM741.

```
riDatasheet = 2e6;
roDatasheet = 75;
Rin250 = 1e3;
Rf250 = Rin250 * 29;
```

Definindo a frequencia de projeto e o capacitor:

```
w250 = 2*pi*250;
c250 = 820e-9;
```

Obtendo R

```
r250 = subs(r,{c,w},{c250,w250});
double(r250)
```

```
ans = 316.9499
```

Com R e C podemos obter as impedancias de entrada/saida da rede RC

```
ZinRC250 = subs(ZinRC,{c,r,w},{c250,r250,w250});
abs(double(ZinRC250))
```

```
ans = 897.0032
```

```
ZoutRC250 = subs(ZoutRC,{c,r,w},{c250,r250,w250});
abs(double(ZoutRC250))
```

```
ans = 142.4584
```

Por fim, definimos ri, ro e as resistencias Rin e Rf sendo Rf == 29Rin de maneira a obtermos as impedancias de entrada/saida do bloco de amplificação

```
ZinAmp250 = subs(ZinAmp, {Rin, Rf, ri, ro}, {Rin250, Rf250, riDatasheet, roDatasheet})
```

```
ZinAmp250 = 29000
```

```
ZoutAmp250 = subs(ZoutAmp, {Rin, Rf, ri, ro}, {Rin250, Rf250, riDatasheet, roDatasheet
double(ZoutAmp250)
```

```
ans = 74.8065
```

Relação de componentes usados/medidos

$\mathrm{Rin} : 1k\Omega - 986\Omega$

$\mathrm{R}f : 30k\Omega \ - 29,5k\Omega$

$C(1) : 820\mathrm{nF} - 781\mathrm{nF}$

$C(2) : 820\mathrm{nF} - 759,1\mathrm{nF}$

$C(3) : 820\mathrm{nF} - 796,4\mathrm{nF}$

$\mathrm{R}(1) : 330\Omega - 304\Omega$

$R(2) : 330\Omega - 305\Omega$

$R(3) : 330\Omega - 301\Omega$

$\text{Pot} : 50k\Omega - 3,8k\Omega$

F = 4,5kHz

Antes de tudo definamos os parâmetros do ampop. Nesse caso o ampop utilizado foi o LM741.

```
Rin4500 = 1e3;
Rf4500 = Rin4500 * 29;
```

Definindo a frequencia de projeto e o capacitor:

```
w4500 = 2*pi*4.5e3;
c4500 = 47e-9;
```

Obtendo R

```
r4500 = subs(r,{c,w},{c4500,w4500});
double(r4500)
```

```
ans = 307.2091
```

Com R e C podemos obter as impedancias de entrada/saida da rede RC

```
ZinRC4500 = subs(ZinRC,{c,r,w},{c4500,r4500,w4500});
abs(double(ZinRC4500))
```

```
ans = 869.4357
```

```
ZoutRC4500 = subs(ZoutRC,{c,r,w},{c4500,r4500,w4500});
abs(double(ZoutRC4500))
```

```
ans = 138.0802
```

Por fim, definimos ri, ro e as resistencias Rin e Rf sendo Rf == 29Rin de maneira a obtermos as impedancias de entrada/saida do bloco de amplificação

```
ZinAmp4500 = subs(ZinAmp, {Rin, Rf, ri, ro}, {Rin4500, Rf4500, riDatasheet, roDatasheet
```

```
ZinAmp4500 = 29000
```

```
ZoutAmp4500 = subs(ZoutAmp, {Rin, Rf, ri, ro}, {Rin4500, Rf4500, riDatasheet, roDatashe
double(ZoutAmp4500)
```

```
ans = 74.8065
```

Relação de componentes usados/medidos

Rin : $1k\Omega - 976\Omega$

Rf : $30k\Omega\ - 27,1k\Omega$

$C(1)$: $47\text{nF} - 47,85\text{nF}$

$C(2)$: $47\text{nF} - 46,93\text{nF}$

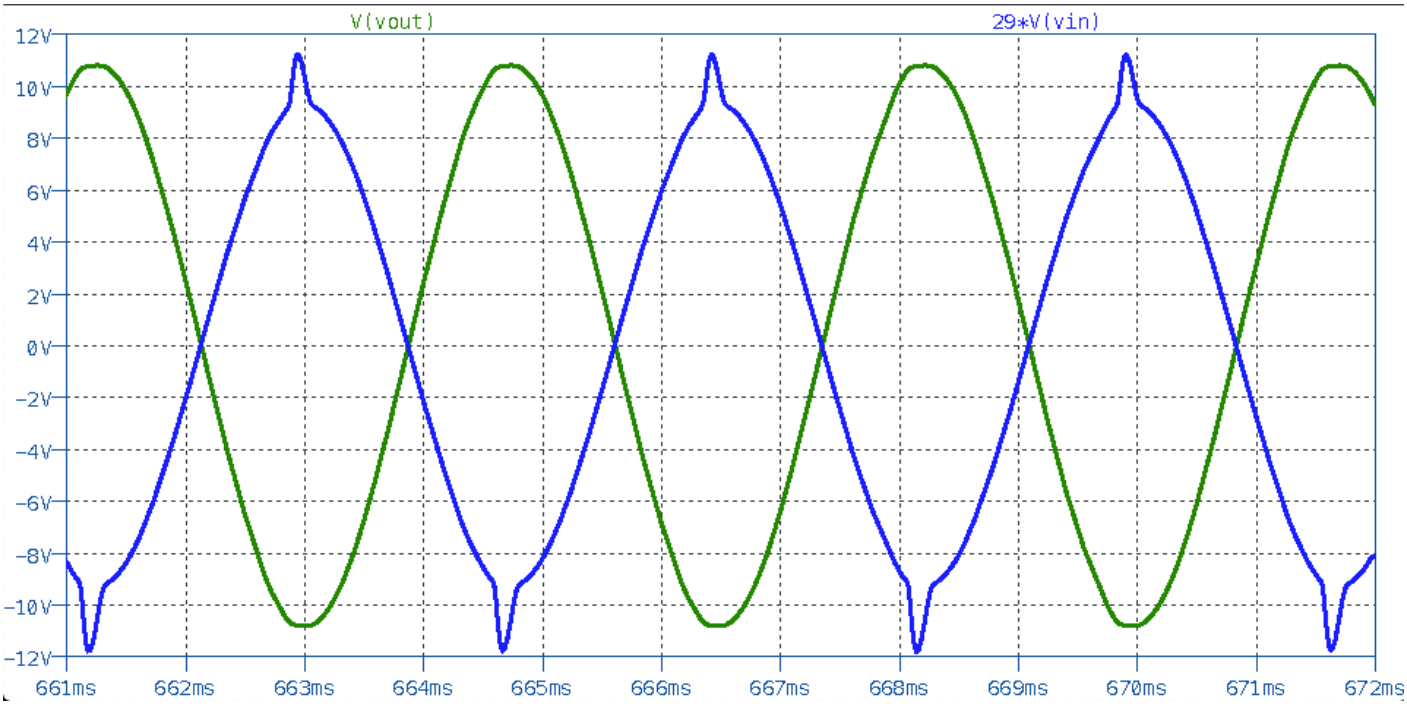
$C(3)$: $47\text{nF} - 45,37\text{nF}$

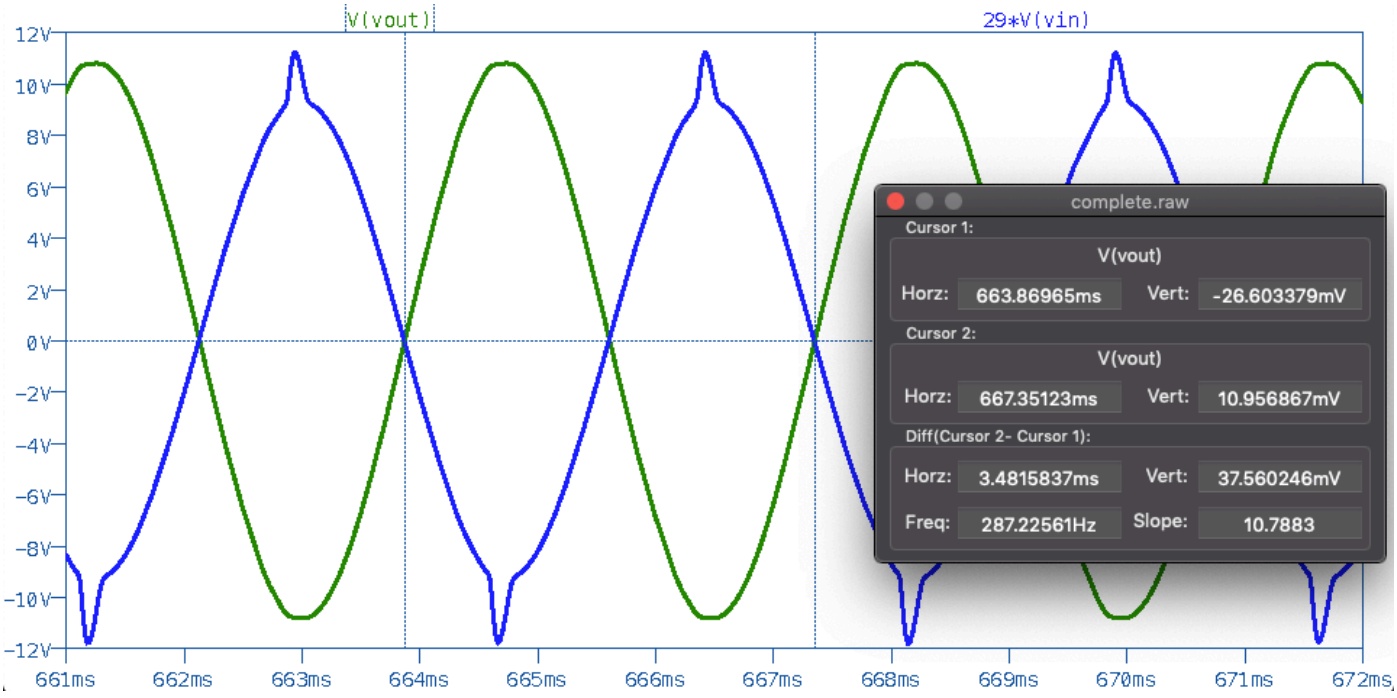
R(1) : $300\Omega - 300\Omega$

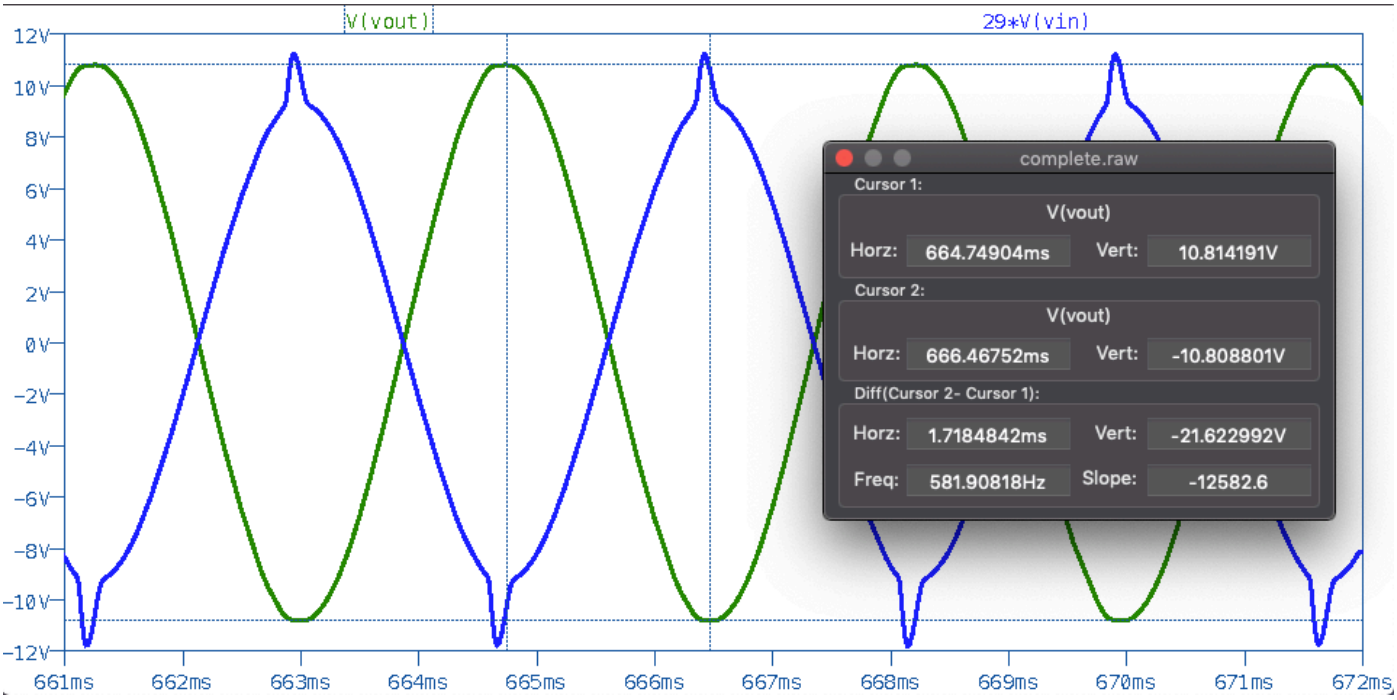
R(2) : $300\Omega - 305\Omega$

R(3) : $300\Omega - 301\Omega$

Pot : $100k\Omega - 23,5k\Omega$







F = 65kHz

Antes de tudo definamos os parâmetros do ampop. Nesse caso o ampop utilizado foi o LM741.

```
Rin65k = 1e3;
Rf65k = Rin65k * 29;
```

Definindo a frequencia de projeto e o capacitor:

```
w65k = 2*pi*65e3;
c65k = 3.3e-9;
```

Obtendo R

```
r65k = subs(r,{c,w},{c65k,w65k});
double(r65k)
```

```
ans = 302.9125
```

Com R e C podemos obter as impedancias de entrada/saida da rede RC

```
ZinRC65k = subs(ZinRC,{c,r,w},{c65k,r65k,w65k});
abs(double(ZinRC65k))
```

```
ans = 857.2758
```

```
ZoutRC65k = subs(ZoutRC,{c,r,w},{c65k,r65k,w65k});
abs(double(ZoutRC65k))
```

```
ans = 136.1490
```

Por fim, definimos ri, ro e as resistencias Rin e Rf sendo Rf == 29Rin de maneira a obtermos as impedancias de entrada/saida do bloco de amplificação

```
ZinAmp65k = subs(ZinAmp, {Rin, Rf, ri, ro}, {Rin65k, Rf65k, riDatasheet, roDatasheet})
```

ZinAmp65k = 29000

```
ZoutAmp65k = subs(ZoutAmp, {Rin, Rf, ri, ro}, {Rin65k, Rf65k, riDatasheet, roDatasheet
double(ZoutAmp65k)
```

```
ans = 74.8065
```

Relação de componentes usados/medidos

$\mathrm{Rin} : 1k\Omega - 993\Omega$

$\mathrm{R}f : 30k\Omega \ - 29,4k\Omega$

$C(1) : 3,3\mathrm{nF} - 3,153\mathrm{nF}$

$C(2) : 3,3\mathrm{nF} - 3,174\mathrm{nF}$

$C(3) : 3,3\mathrm{nF} - 3,200\mathrm{nF}$

$\mathrm{R}(1) : 300\Omega - 330\Omega$

R(2) : 300Ω – 327Ω

R(3) : 300Ω – 329Ω