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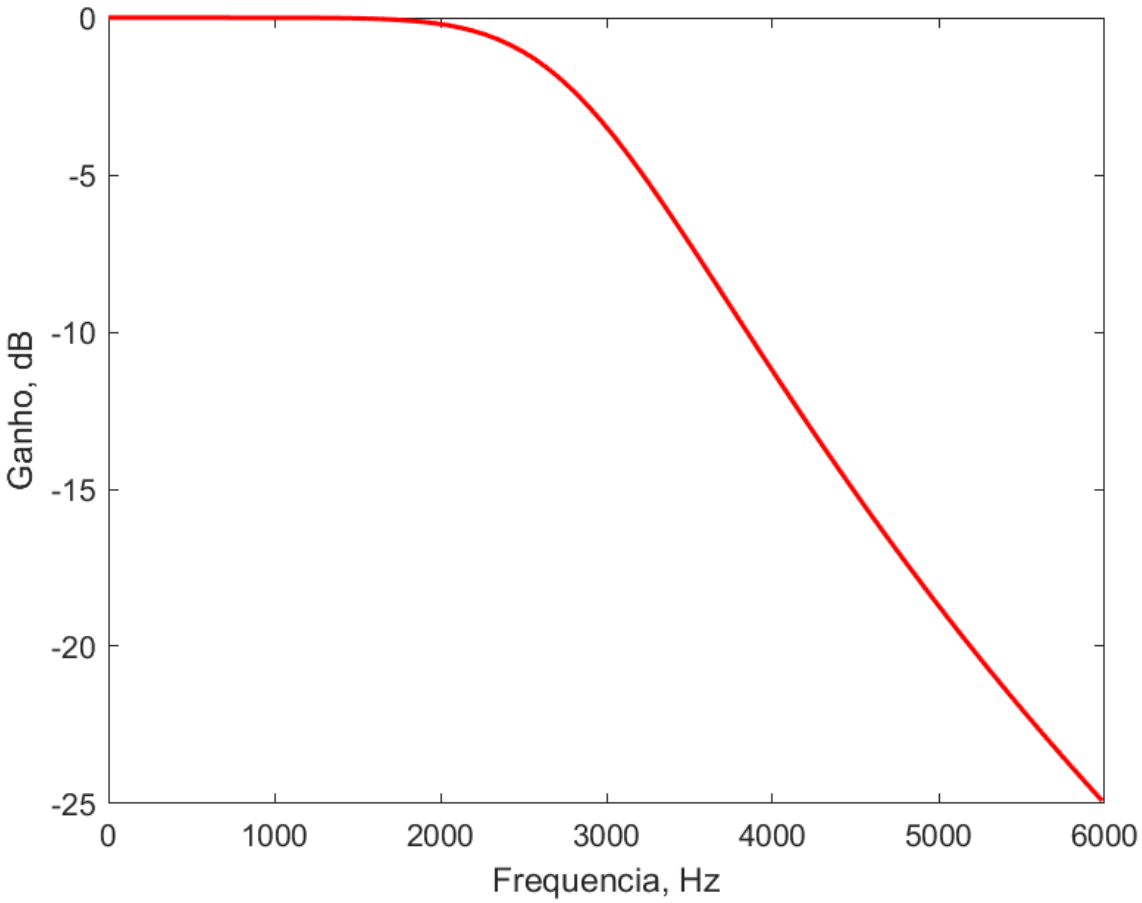
1)

```
Rp = 0.25;
fc = 1.5e3;
Rs = 25;
f = 6e3;
Wp = 2*pi*fc;
Ws = 2*pi*f;

[N,Wn] = buttord(Wp, Ws, Rp, Rs, 's')

[num, den] = butter(N, Wn, 's');
omega = [0: 200: 12000*pi];
h = freqs(num,den,omega);
plot (omega/(2*pi),20*log10(abs(h)),'r','linewidth',1.5);
xlabel('Frequencia, Hz');
ylabel('Ganho, dB');
```

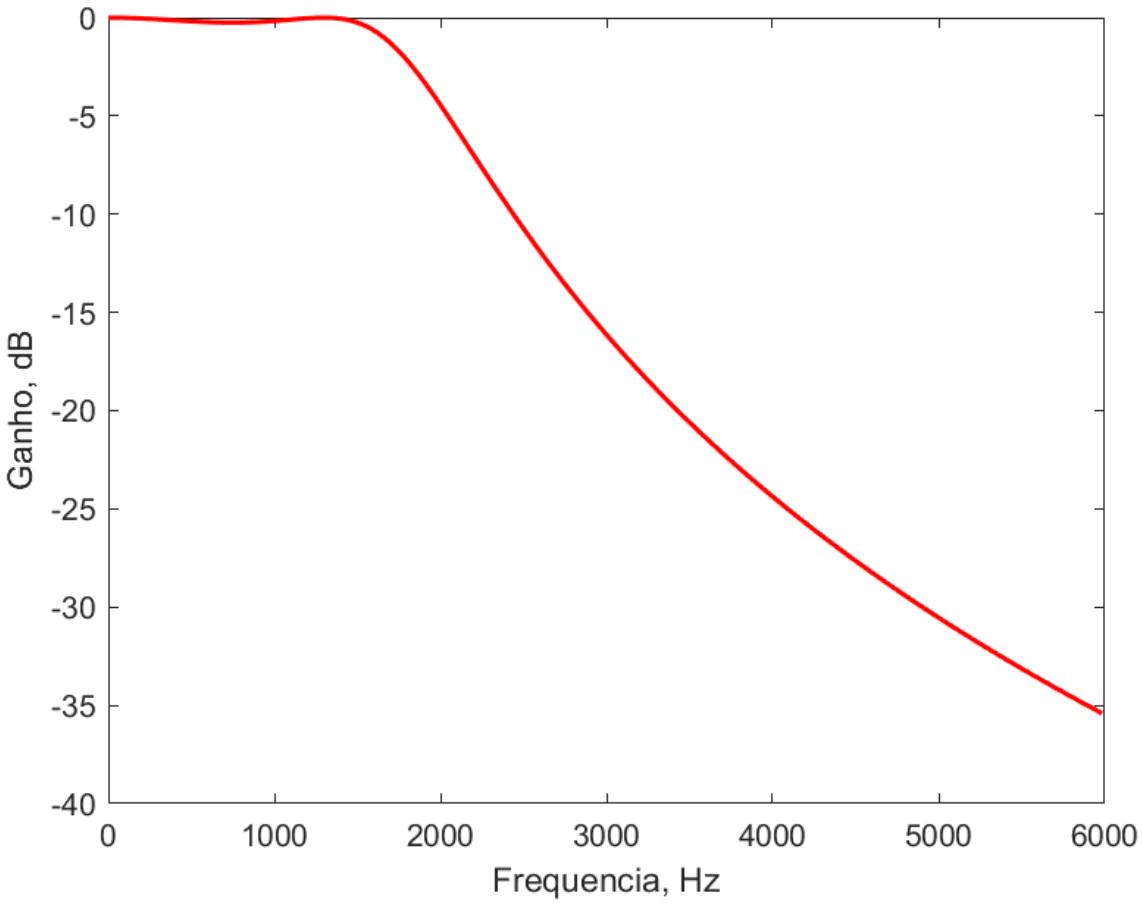


2)

```
Rp = 0.25;
fc = 1.5e3;
Rs = 25;
f = 6e3;
Wp = 2*pi*fc;
Ws = 2*pi*f;

[N,Wn] = cheb1ord(Wp, Ws, Rp, Rs, 's')

[num, den] = cheby1(N, Rp, Wp, 's');
omega = [0: 200: 12000*pi];
h = freqs(num,den,omega);
plot (omega/(2*pi), 20*log10(abs(h)),'r','linewidth',1.5);
xlabel('Frequencia, Hz');
ylabel('Ganho, dB');
```

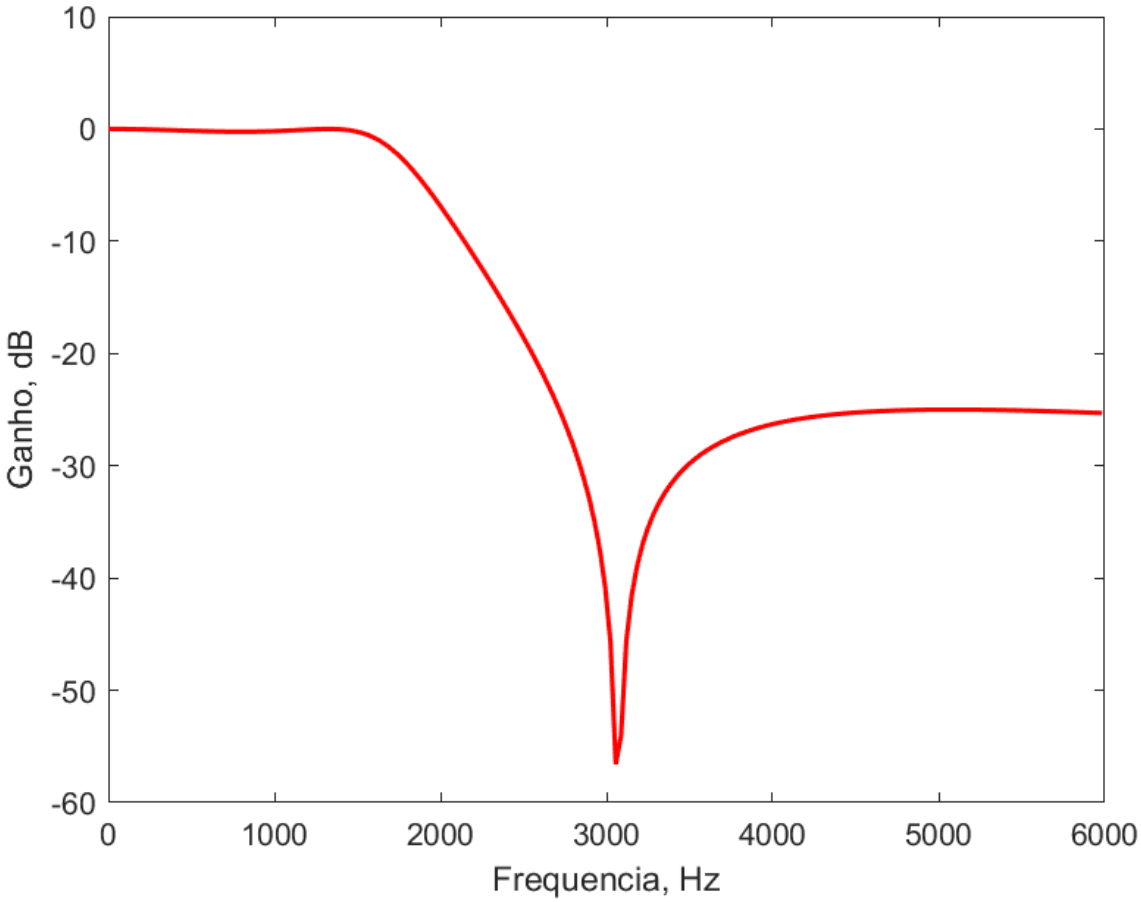


3)

```
Rp = 0.25;
fc = 1.5e3;
Rs = 25;
f = 6e3;
Wp = 2*pi*fc;
Ws = 2*pi*f;

[N,Wn] = ellipord(Wp, Ws, Rp, Rs, 's')
```

```
[num, den] = ellip(N, Rp, Rs, Wp, 's');
omega = [0: 200: 12000*pi];
h = freqs(num,den,omega);
plot (omega/(2*pi),20*log10(abs(h)),'r','linewidth',1.5);
xlabel('Frequencia, Hz');
ylabel('Ganho, dB');
```

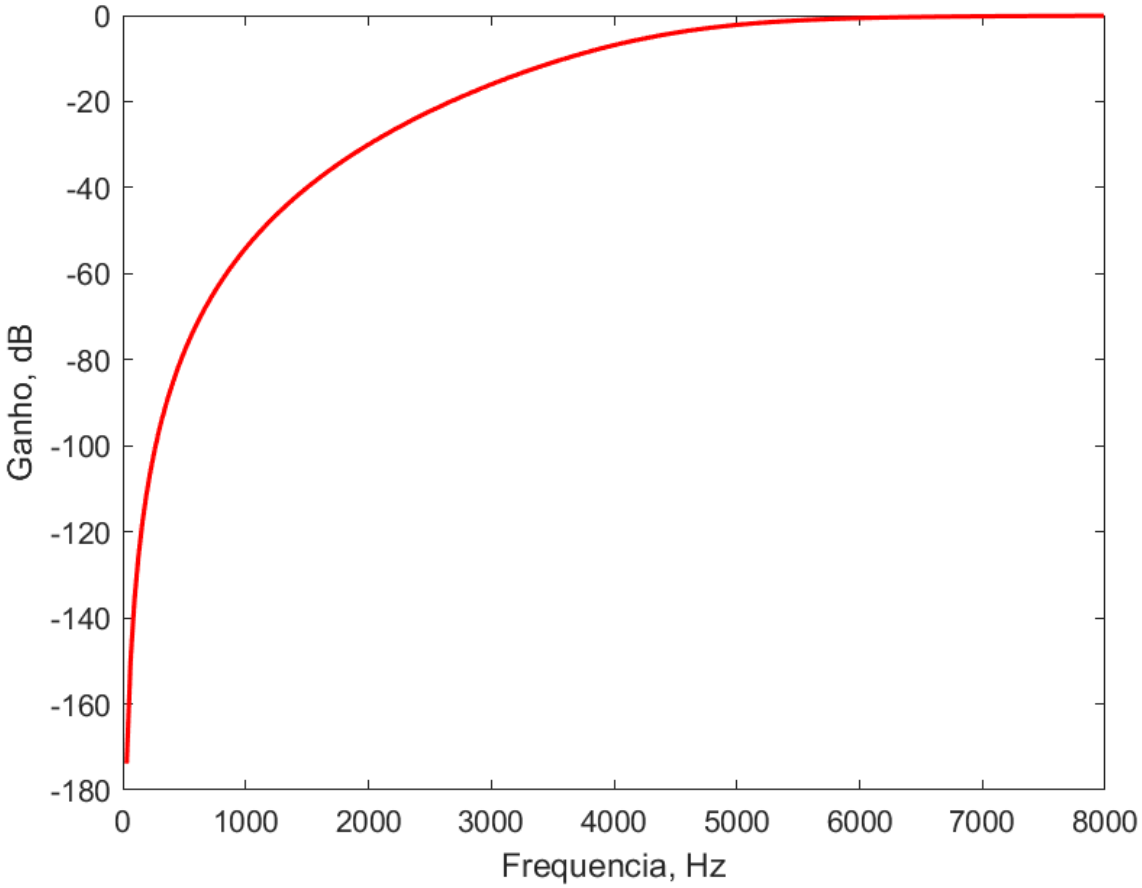


4)

```
fbp = 6.5e3;
fbr = 1.5e3;
Rp = 0.5;
Rs = 40;

[N,Wn]=buttord(13000*pi, 3000*pi, Rp, Rs,'s')

[num,den]=butter(N,Wn,'high','s');
omega = [0: 200: 16000*pi];
h = freqs(num,den,omega);
plot (omega/(2*pi),20*log10(abs(h)),'r','linewidth',1.5);
xlabel('Frequencia, Hz');
ylabel('Ganho, dB');
```

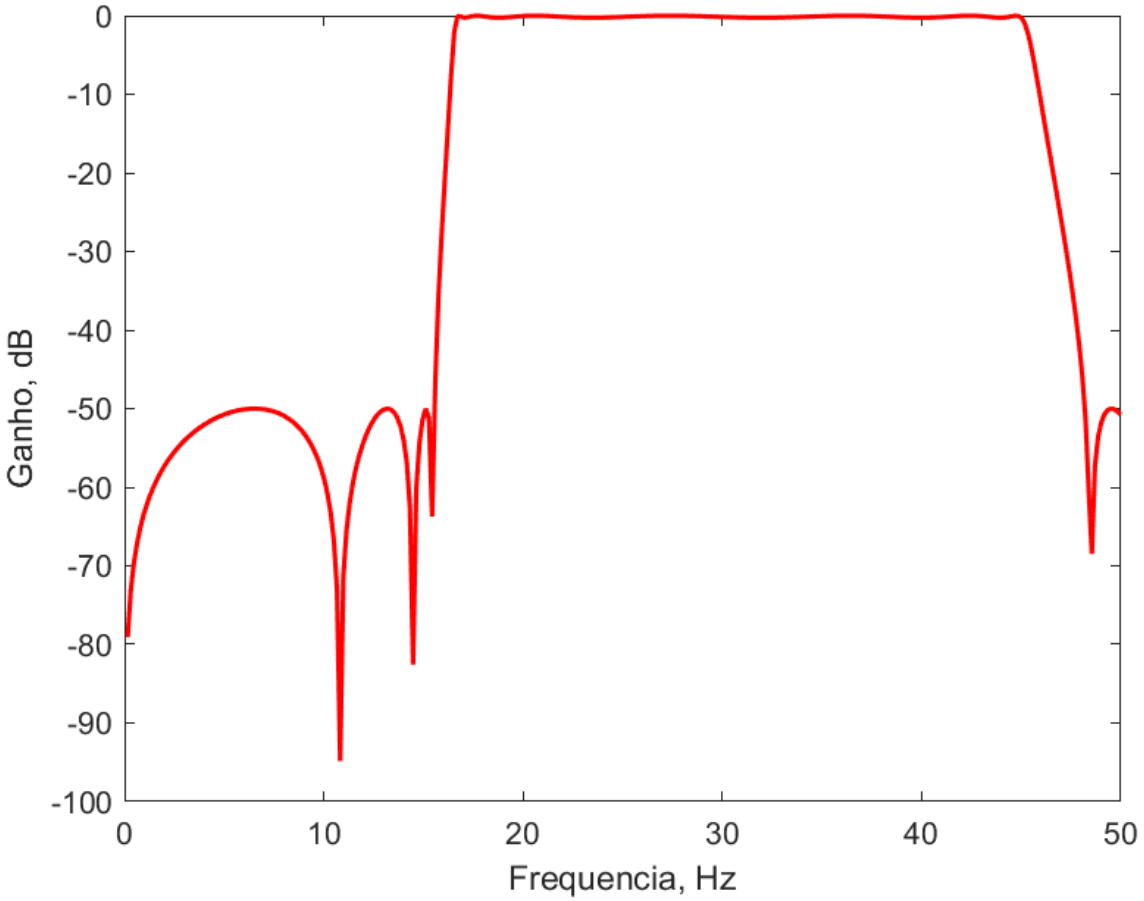


5)

```
fbp = [15*50/45 45]*2*pi;
fbr = [15 50]*2*pi;
Rp = 0.25;
Rs = 50;

[N,Wn] = ellipord(fbp, fbr, Rp, Rs,'s')

[num,den]=ellip(N, Rp, Rs, Wn, 's');
omega = [0:1:100*pi];
h = freqs(num,den,omega);
plot (omega/(2*pi),20*log10(abs(h)),'r','linewidth',1.5);
xlabel('Frequencia, Hz');
ylabel('Ganho, dB');
```

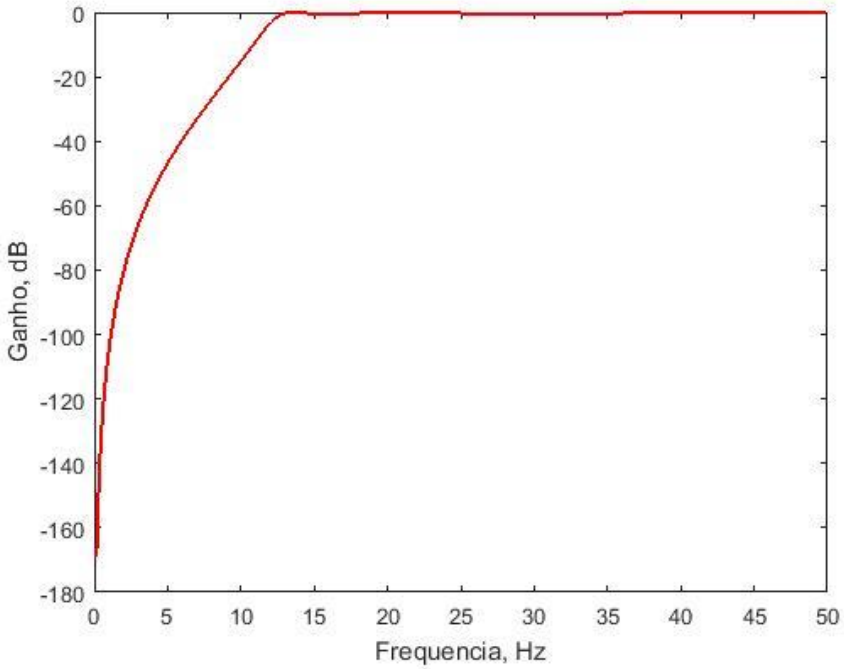


6)

```
fbp = [20*45/70 70]*2*pi;
fbr = [20 45]*2*pi;
Rp = 0.5;
Rs = 30;

[N,Wn] = cheb1ord(fbp, fbr, Rp, Rs,'s')

[num,den]=cheby1(N, Rp, Wn, 's');
omega = [0:1:100*pi];
h = freqs(num,den,omega);
plot (omega/(2*pi),20*log10(abs(h)),'r','linewidth',1.5);
xlabel('Frequencia, Hz');
ylabel('Ganho, dB');
```


0
-20
-40
-60
-80
-100
-120
-140
-160
-180
Ganho, dB
0
5
10
15
20
25
30
35
40
45
50
Frequencia, Hz