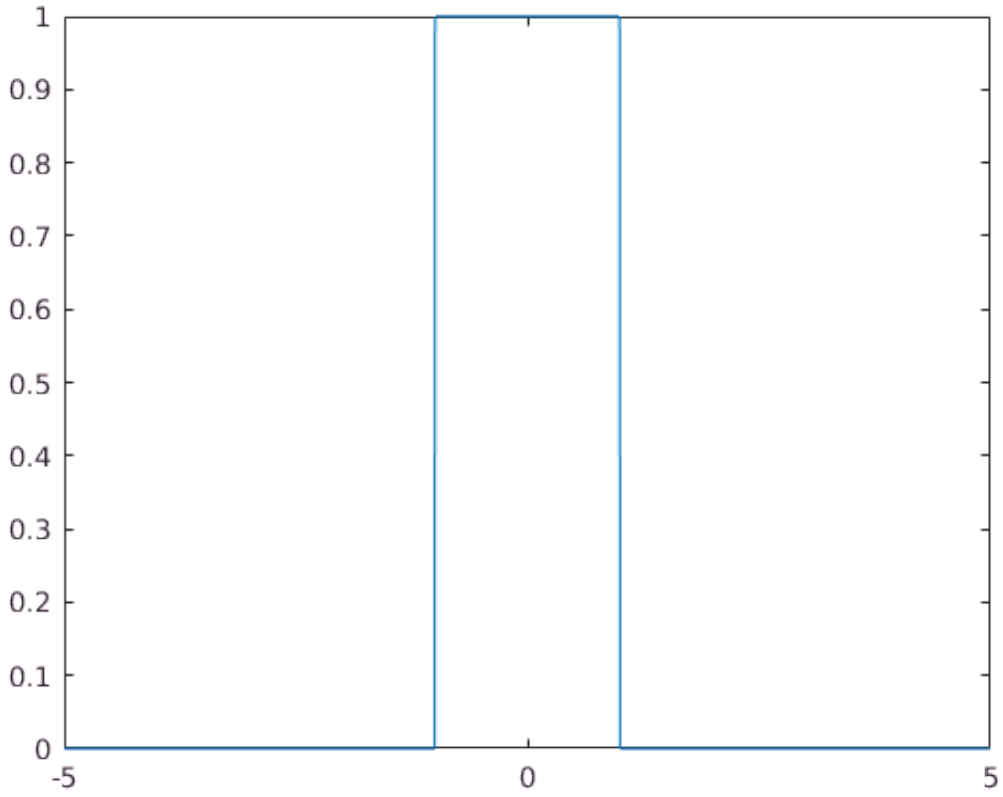
exercice 1:

1.

```
clear variables;

D=5;
t=-D:0.005:D-0.005;
```

2.

```
p=porte(t/2);
figure(1);
plot(t,p);
```



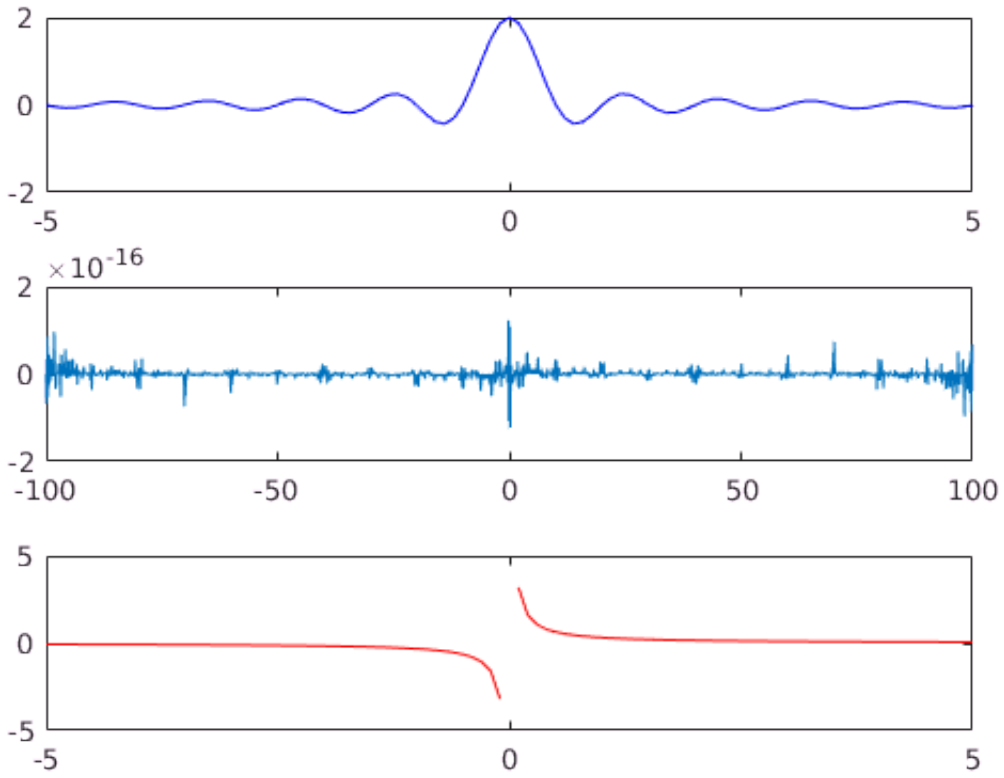

```

```

3.

```
[P,f]=TransFourier(p,t);
figure(2);hold on;
subplot(311); plot(f,P,'b');xlim([-D;D]);
```

```
Warning: Imaginary parts of complex X and/or Y arguments ignored
```

```
subplot(312);plot(f,imag(P));
subplot(313);plot(f,real(P));plot(f,(1./(pi*f)),'r');xlim([-D;D]);
```



La fonction Porte est paire et reel dans l'espace temporelle, donc sa transformée de Fourier est reel et paire. Il y a tout de meme une partie imaginaire non nulle a cause de l'imprecision du calcul numérique, mais reste négligeable (e-16).

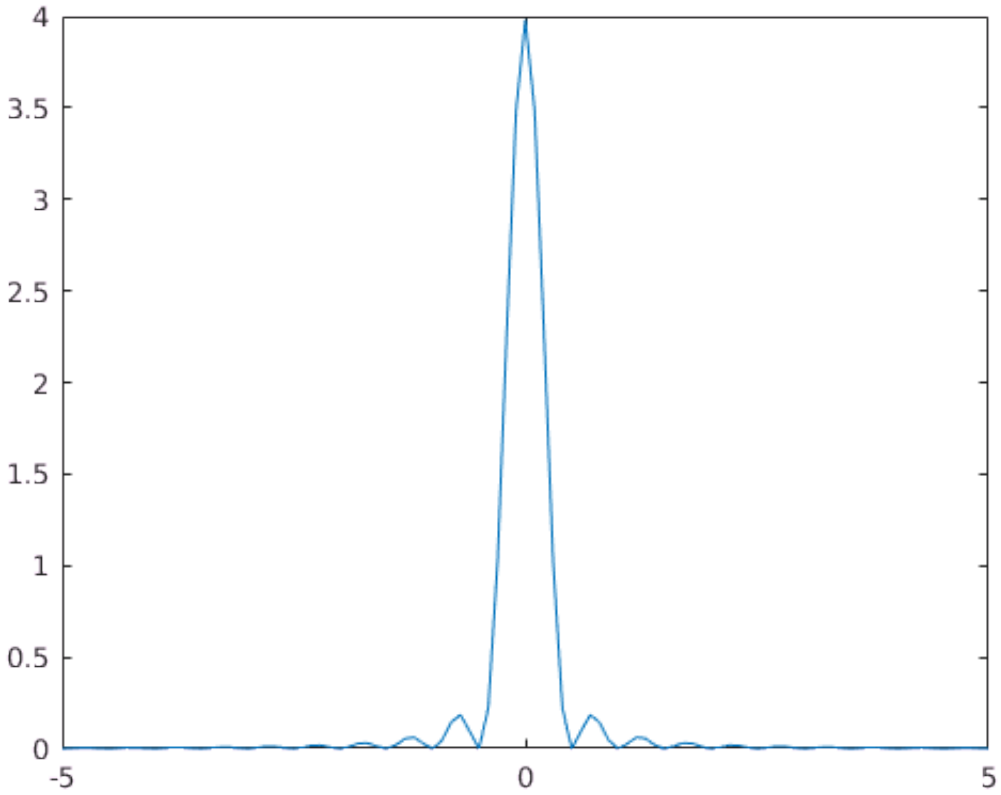
L'amplitude a l'origine de P vaut 2, donc cette amplitude vaut T.

Grace aux curseurs on obtiens que la periode secondaire vaut 1.

les amplitudes sont decroissantes a la vitesse 1/(pi*T).

P(f) n'est pas a bande spectrale finie car p(t) est de bande spectrale finie.

```
gamma_p=(abs(P)).^2;
figure(3);plot(f,gamma_p);xlim([-D;D]);
```

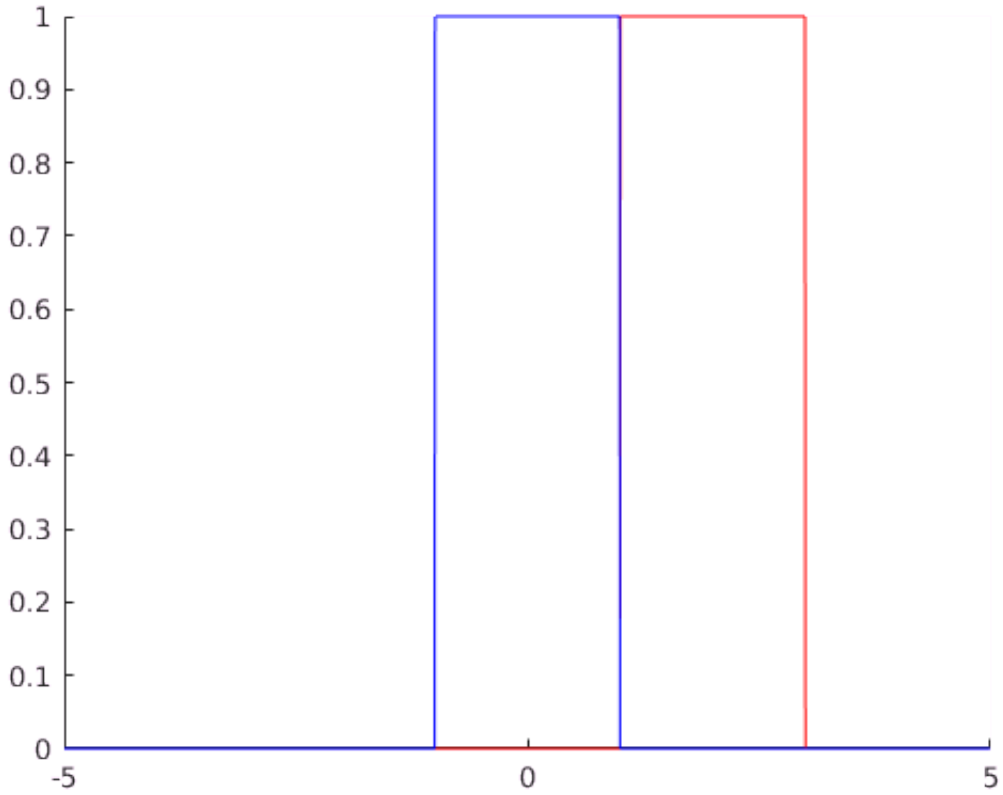


On a T_lobe_primair=1, T_lobe_secondaire=0.5

```
fmin = 1;
fmax = 2;
```

4.

```
t0=2;
p0=porte((t-t0)/2);
figure(4);hold on;
plot(t,p0,'r');plot(t,p,'b');
```




```
[P0,f]=TransFourier(p0,t);
figure(5);subplot(211);plot(f,P);xlim([-D;D]);subplot(212);plot(f,P0);xlim([-D;D]);
```

```
Warning: Imaginary parts of complex X and/or Y arguments ignored
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```
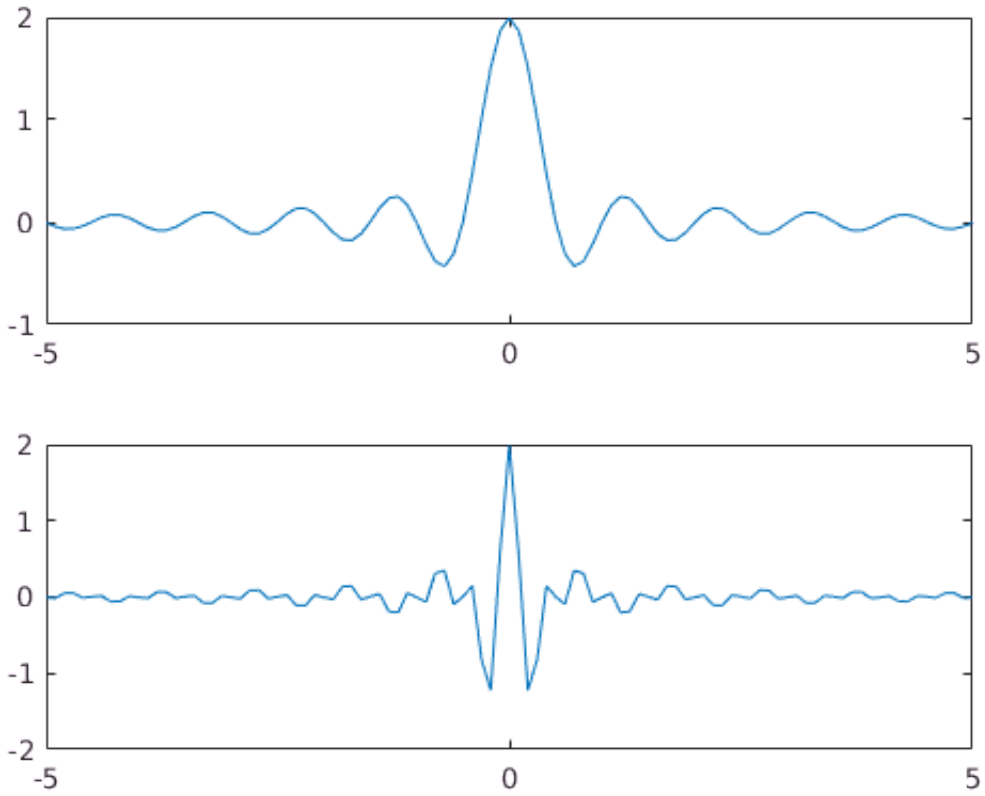
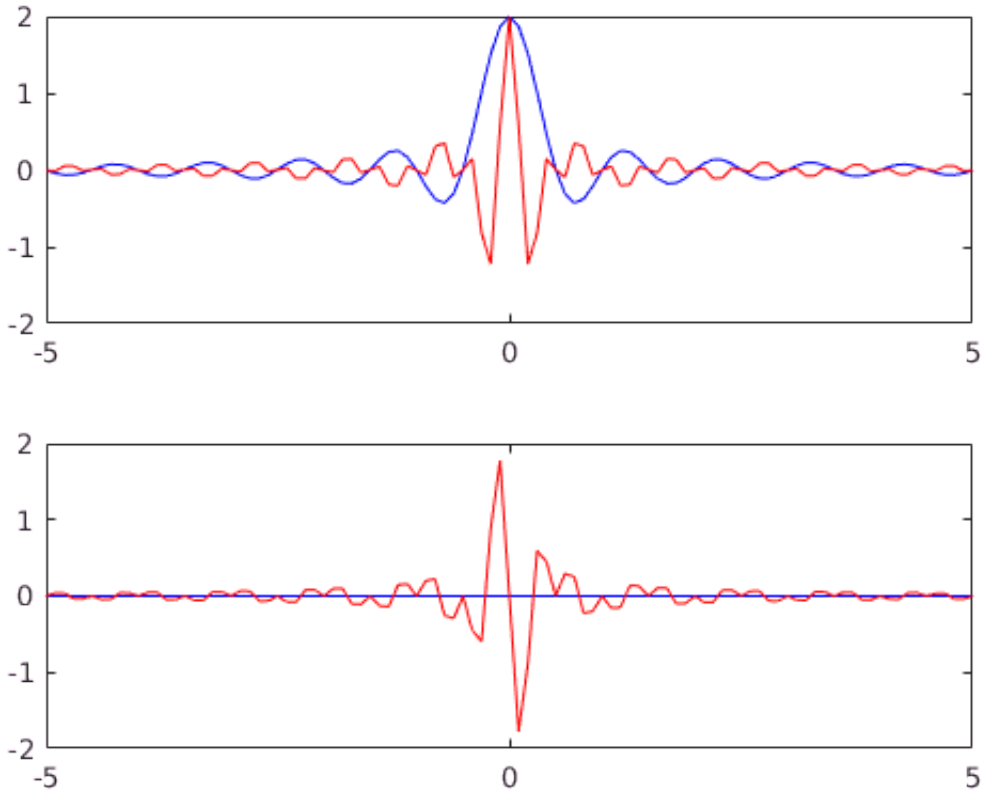



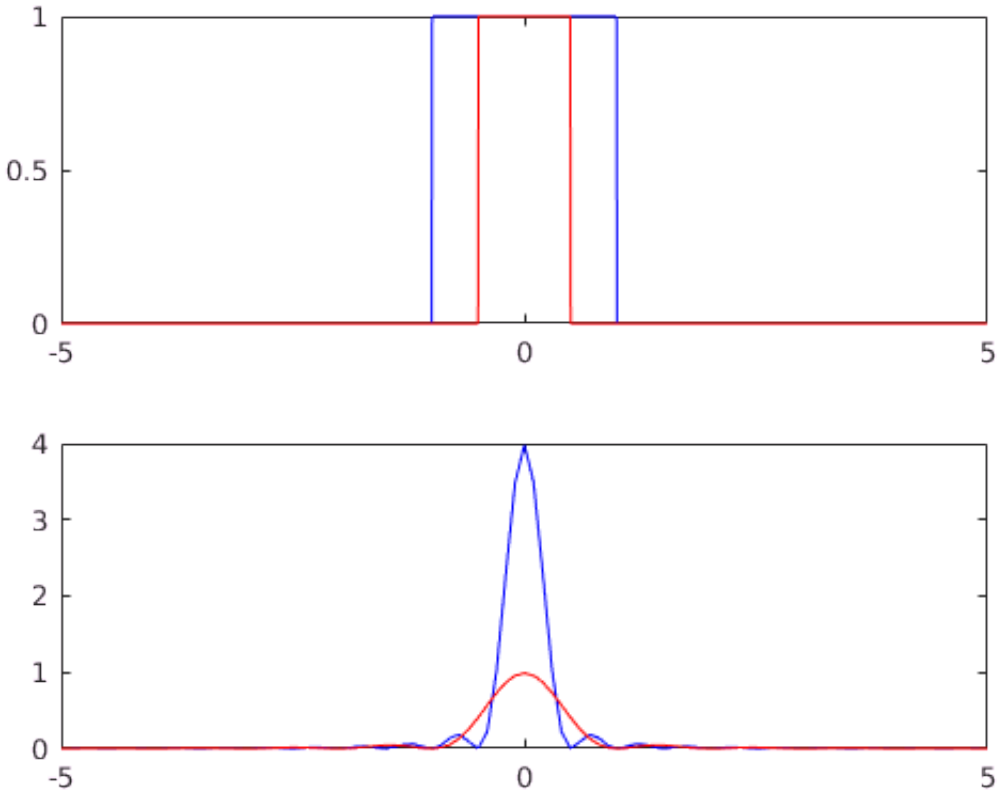

```
figure(6);
subplot(211);plot(f,real(P),'b',f,real(P0),'r');xlim([-D;D]);
subplot(212);plot(f,imag(P),'b',f,imag(P0),'r');xlim([-D;D]);
```



Parce que quand on applique la formule du retard on se retrouve avec exp(2i*pi*t0) qui rend la partie réelle de la fonction nulle.

5.

```
a = 2;
pa = porte((a*t)/2);

PA = TransFourier(pa,t);
gamma_pa = (abs(PA)).^2;
figure(7);
subplot(211);plot(t,p,'b',t,pa,'r');
subplot(212);plot(f,gamma_p,'b',f,gamma_pa,'r');xlim([-D;D]);
```


1
0.5
0
-5
0
5
4
3
2
1
0
-5
0
5