Compte Rendu
TP n°1

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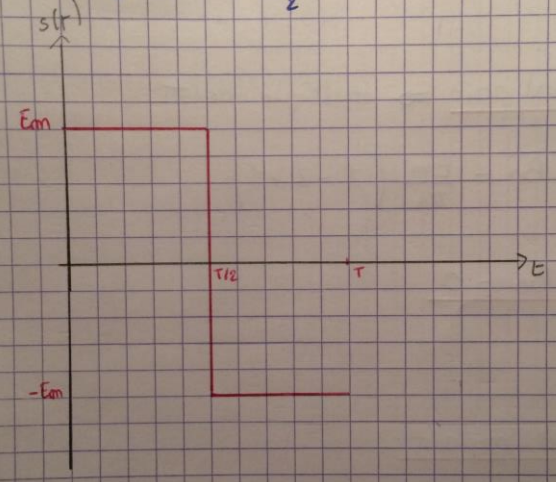
2.2 Travail demandé

2.2.1 Préparation

a.

a.

$$s(t) = \begin{cases} +E_m & \text{si } 0 \le t \le \frac{T}{2} \\ -E_m & \text{si } \frac{T}{2} \le t \le T \end{cases}$$



La fonction s(t) est impaire.

Donc $A_n = 0$

$A_0 = 0$

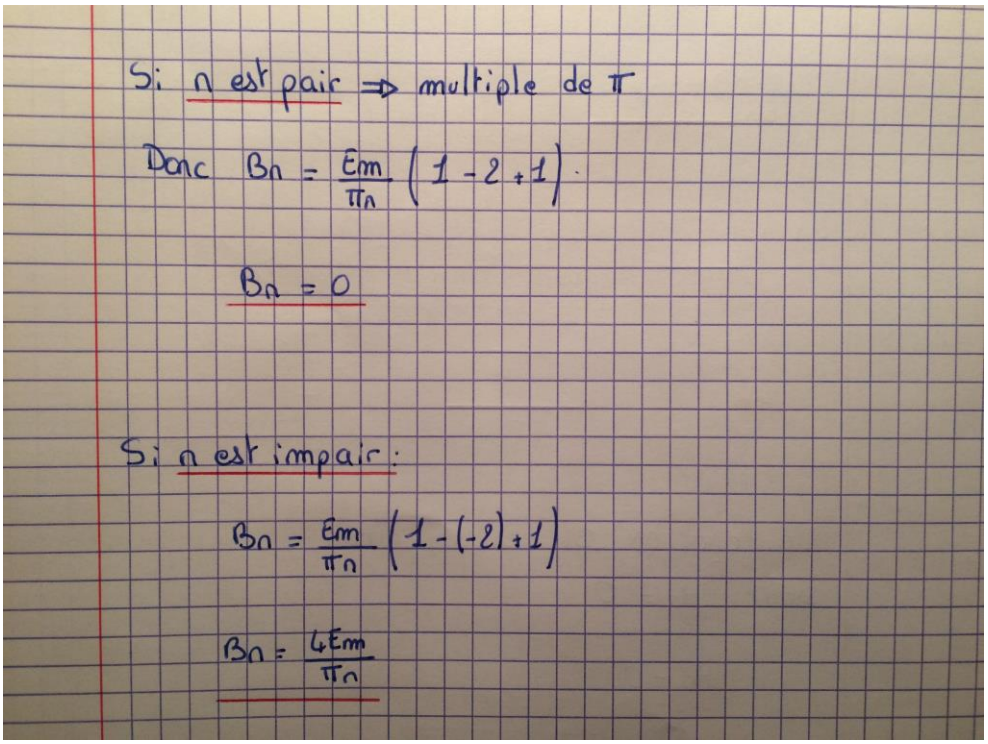
$$B_n = \frac{2}{T}\int_T s(t)\sin\left(2\pi\frac{n}{T}t\right)dt$$

$$B_n = \frac{2}{T}\int_0^{T/2} E_m \sin\left(2\pi\frac{n}{T}t\right)dt + \frac{2}{T}\int_T^{T/2} E_m \sin\left(2\pi\frac{n}{T}t\right)dt$$

$$B_n = \frac{2E_m}{T}\left[\frac{-\cos\left(2\pi\frac{n}{T}t\right)}{2\pi\frac{n}{T}}\right]_0^{T/2} + \frac{2E_m}{T}\left[\frac{-\cos\left(2\pi\frac{n}{T}t\right)}{2\pi\frac{n}{T}}\right]_T^{T/2}$$

$$B_n = \frac{2E_m}{T}\left(\frac{-\cos(\pi n)}{2\pi\frac{n}{T}} + \frac{1}{2\pi\frac{n}{T}} - \frac{\cos(\pi n)}{2\pi\frac{n}{T}} + \frac{\cos(2\pi n)}{2\pi\frac{n}{T}}\right)$$

$$B_n = \frac{E_m}{\pi n}\left(1 - 2\cos(\pi n) + \cos(2\pi n)\right)$$

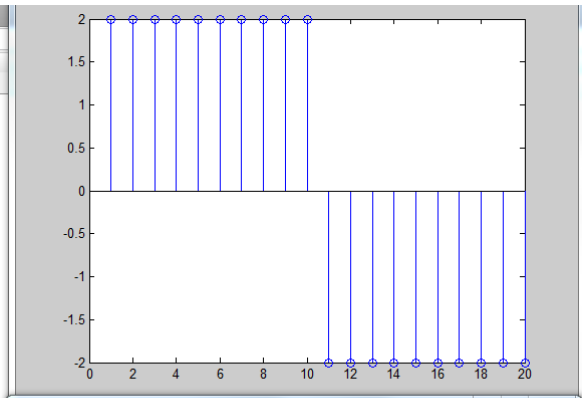

Si n est pair ⇒ multiple de π
Donc $B_n = \frac{E_m}{\pi_n}(1-2+1)$
$B_n = 0$
Si n est impair :
$B_n = \frac{E_m}{\pi_n}(1-(-2)+1)$
$B_n = \frac{4E_m}{\pi_n}$

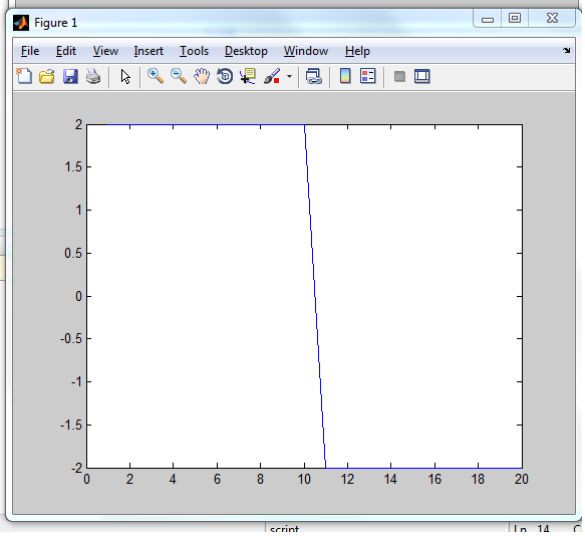
b.

2.2.2 Manipulation

a & b.

```
Em = 2;
fo=50
fs = 1000
N=20 %durée de l'échantillonage
t=0:1/fs:N; % crée un vecteur t entre 0 et 20 de fréquence d'échantillonage 1/fs
s1 = Em * ones (1,N/2)
s2 = -Em * ones (1,N/2)
s = [s1,s2];

figure(1)
plot (s);

figure (2)
stem(s);
```

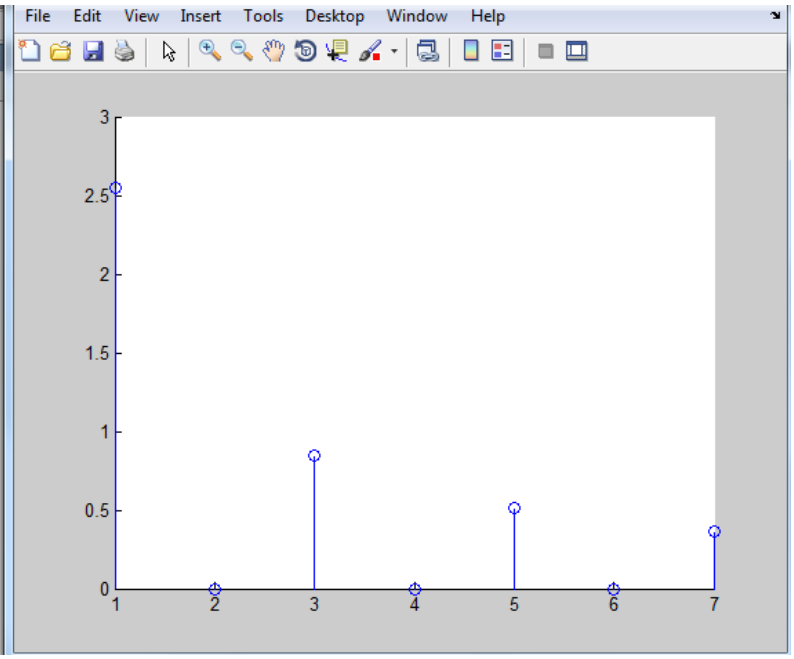




```
Command Window
New to MATLAB? Watch this Video, see Examples, or read Getting Started.
     20


s1 =

     2     2     2     2     2     2     2     2     2     2

s2 =

    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2

>>
```

c.

```
Em = 2;

for n=1:7
    if mod(n,2)==0
       Bn=0;
    else
        Bn=(4*Em)/(pi*n);
    end

    hold on;
    figure(1);
    stem(n,Bn);
end
```

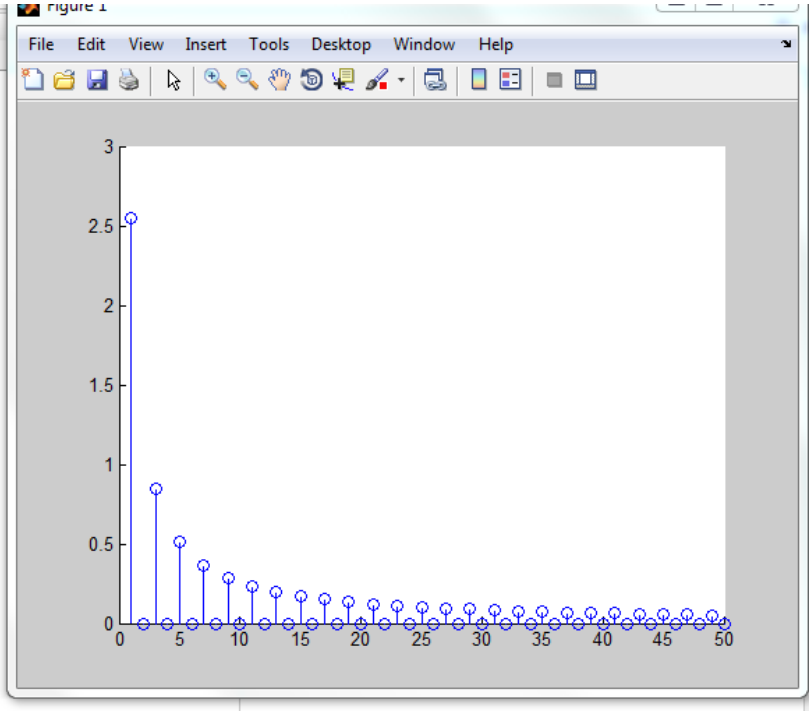


d. On a fait varier N en le faisant passer de 7 à 50. La courbe est plus précise.

Editor - H:\Documents\TP_TS\TP1\TP1.m

TP1.m

```
1 -   Em = 2;
2
3 -   for n=1:50
4 -       if mod(n,2)==0
5 -          Bn=0;
6 -       else
7 -           Bn=(4*Em)/(pi*n);
8 -       end
9
10 -      hold on;
11 -      figure(1);
12 -      stem(n,Bn);
13 -  end
```



e.

```
8   %
9   %     hold on;
10  %     figure(1);
11  %     stem(n,Bn);
12  % end
13
14
15  % Somme
16 - t=0:1/fs:0.2
17 - s=0;
18 - Em = 2;
19 - f=50
20 - fs=1000
21
22 - for n=1:50
23 -     if mod(n,2)==0
24 -         Bn=0;
25 -     else
26 -         Bn=(4*Em)/(pi*n);
27 -         s = s + Bn*sin(2*pi*n*f*t)
28 -     end
29 - end
30
31 - figure(1)
32 -     plot (t*1000,s,'red')
```