Test N°02

Name:....

Exercice 01 : (5 points)

Let the signal be $s(t) = a_1 . \cos(2.\pi . f_1 . t) + a_2 . \cos(2.\pi . 3 . f_1 . t)$ with $f_1 > 0$.

Se(t) is the sampled signal with a sampling interval fe=100Hz.

1- Give the expression of S(f) (the Fourier transform of s(t)).

2- Represent S(f).

3- Give the expression of the Fourier transform of se(t): Se(f).

4- Let $f_1=20Hz$, $a_1=1$, $a_2=2$, and $f_e=100Hz$.. Represent on the same graph the modulus of S(f) and S_e(f) between 0 and f_e.

5- From the samples of the signal, can we correctly reconstruct s(t)? Why?

Exercice 02 : (2.5 points)

Calculate and represent the energy spectral density of the signal $x(n) = a^n u(n)$, where -1 < a < 1.

Exercice Nº3: (2.5 points)

Calculate the spectrum X(w) using the Fourier Transform :

$$x(n) = \begin{cases} 1 & if \quad 0 \le n \le N-1 \\ 0 & else \end{cases}$$