Lab 8

23 January 2023 10:24

Name : TRAN, Thanh Cong

Student ID : 2210421

8.1)

$$x_a(t) = e^{-1000|t|}$$

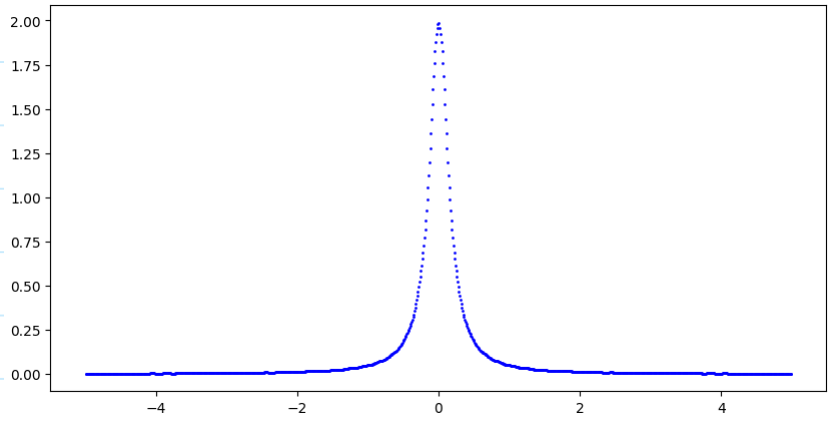
$$X_a(jw) = \int_{-\infty}^{+\infty} x_a(t)\, e^{-jwt}\, dt$$

$$= \int_{-\infty}^{+\infty} e^{-1000|t|}\, e^{-jwt}\, dt$$

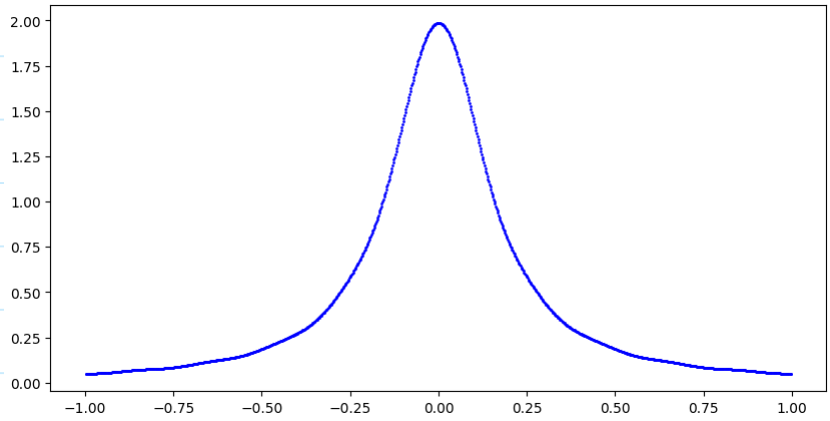
$$= \int_{-\infty}^{0} e^{1000t}\, e^{-jwt}\, dt + \int_{0}^{+\infty} e^{-1000t}\, e^{-jwt}\, dt$$

$$= \frac{0.002}{1+\left(\frac{w}{1000}\right)^2}$$

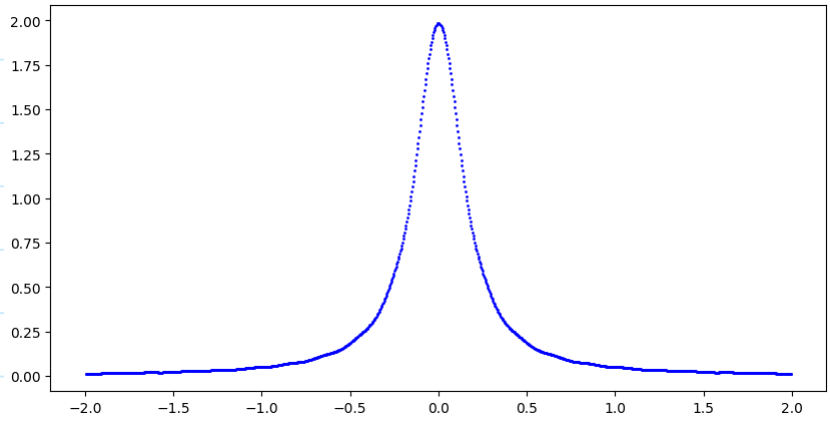
a) $F_s = 5000$



b) $F_s = 1000$



c) F_s: 2000 (A+1)



8.2)

$$x_a(t) = 3\cos 50\pi t + 10\sin 200\pi t - \cos 100\pi t$$

a) The frequencies present in this signal are: 25 Hz, 100 Hz, 50 Hz

b) The largest frequency is 100 Hz ⇒ Nyquist rate = 2.100 = 200 Hz

c) The discrete signal obtained after sampling is:

$$x(k) = 3\cos\frac{50\pi}{200}t + 10\sin\frac{200\pi}{200}t - \cos\frac{100\pi}{200}t$$

$$= 3\cos\frac{\pi}{4}t + 10\sin\pi t - \cos\frac{\pi}{2}t$$