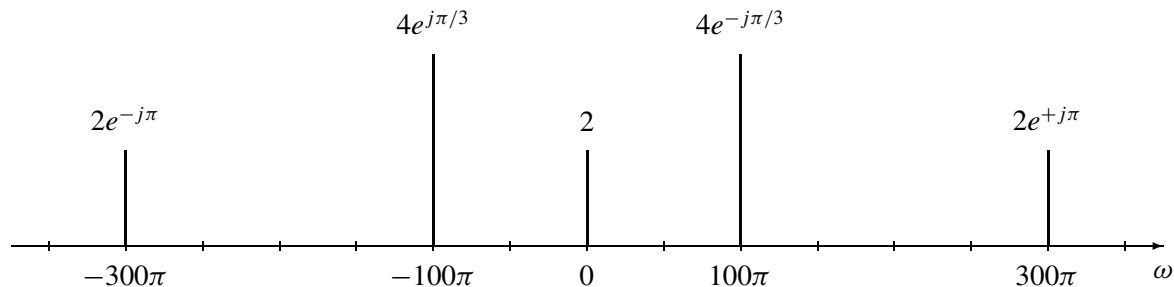


**PROBLEM:**

The spectrum of a signal  $x(t)$  is shown in the following figure:



**Note carefully that the frequency axis is radian frequency ( $\omega$ ) *not* cyclic frequency ( $f$ ).**

(a) Write an equation for  $x(t)$  in terms of cosine functions.

(b) Is  $x(t)$  periodic? **You must explain this answer. Why or why not?**

If it is periodic, what is the fundamental frequency and corresponding period of  $x(t)$ ?

(c) A new signal is defined as  $y(t) = \cos(\alpha t + \pi) + x(t)$ . It is known that  $y(t)$  is periodic with period  $T_0 = 0.04$  sec. Determine **two** positive values for the frequency  $\alpha$  that will satisfy this condition.

(d) Using either of the frequencies  $\alpha$  found in (c), modify the spectrum plot above so that it becomes the spectrum of  $y(t)$ .