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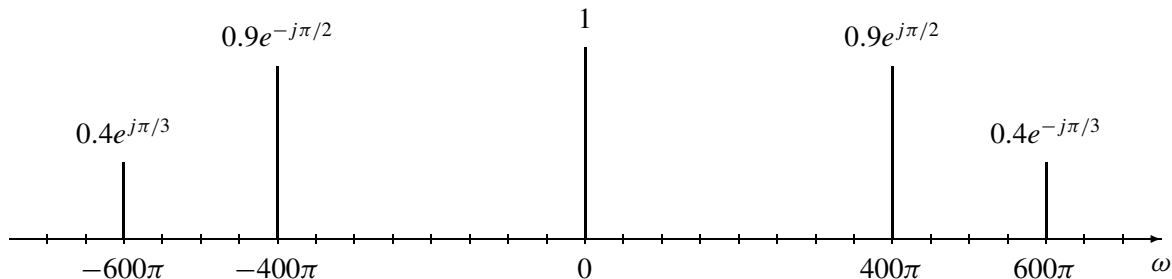
The spectrum of a signal $x(t)$ is shown in the following figure:



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 $\omega_0$ and corresponding period $T_0$ of $x(t)$?

(c) A new signal is defined as $y(t) = \cos(\beta t + \pi) + x(t)$. Choose the radian frequency $\beta$ so that the fundamental frequency of $y(t)$ is *half* the fundamental frequency of $x(t)$. *Note: There may be more than one possible solution.*

(d) Using the frequency $\beta$ found in (c), modify the spectrum plot above so that it becomes the spectrum of $y(t)$. *Label the complex amplitude as well as the frequency.*