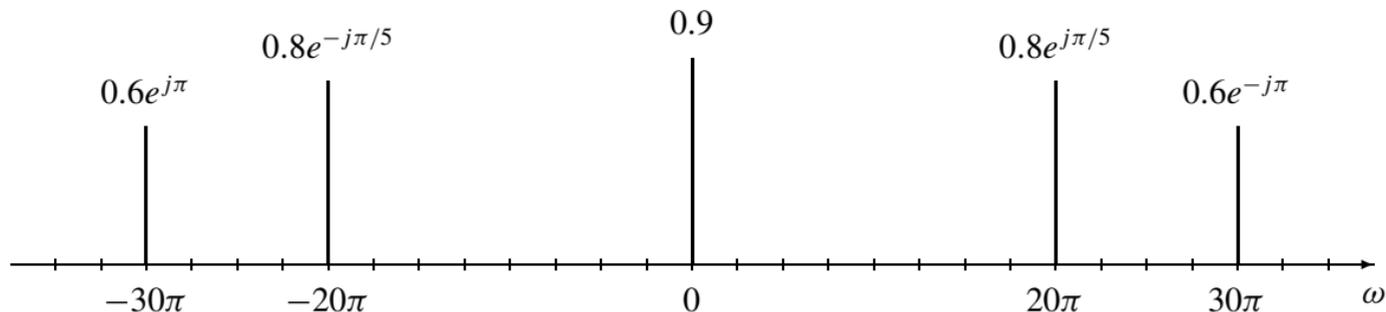


PROBLEM:

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



Note carefully that the frequency axis is radian frequency (ω) *not* cyclic frequency (f).

- Write an equation for $x(t)$ in terms of cosine functions.
- Is $x(t)$ periodic? **You must explain this answer. Why or why not?**
If it is periodic, what is the fundamental frequency ω_0 and corresponding period T_0 of $x(t)$?
- A new signal is defined as $y(t) = \cos(\beta t - \pi/4) + x(t)$. Choose the radian frequency β 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.*
- Using the frequency β 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.*