EE3212 Extra Problems (Chapter 5)

1. Given an input of

\[ x(t) = 4 + 2 \cos(10t + \pi/4) + 3 \cos(30t - \pi/2) \]

Find the output \( y(t) \) to each of the following filters.

a) ![Diagram](image1)

b) ![Diagram](image2)

c) \( H(\omega) = \sin(\omega/20) \)

d) ![Graph](image3)

2) Design a filter to give a response of \( y(t) = 6 \cos(30t) \) for the input given in problem 1).
3) Match the time domain responses to the frequency domain responses:
4) Given $X(\omega)$ as follows, sketch $|Y(\omega)|$ for the different filters shown below.
5) Show the demodulation system needed for a carrier signal of \( \cos(100,000t) \) where the signal \( x(t) \) is bandlimited by 100 Hz.