COMMUNICATION THEORY, Homework Assignment 1, Fall 2023

Two finite-power, periodic signals $x_1(t)$ and $x_2(t)$ have the following time-domain expressions:

$x_1(t) = A_1 \cos(2\pi f_1 t + \varphi_1)$ with $A_1 = 3$, $f_1 = 4$ MHz, $\varphi_1 = \pi/2$

$x_2(t) = A_2 \cos(2\pi f_2 t + \varphi_2)$ with $A_2 = 2$, $f_2 = 5$ MHz, $\varphi_2 = -\pi/4$

The two signals are added together to form the signal $x(t) = x_1(t) + x_2(t)$

a) Find the time period and the fundamental frequency of the signal $x(t)$.

b) Draw a picture of the two-sided spectrum of the signal $x(t)$.

c) Calculate the average power of the signal $x(t)$.