Fall 2018 - Mid-Term 2
ECE 301: Signals and Systems

Prof.Aly El Gamal

Last Name :

First Name :

PUID :

Instructions.

- Write your full name, PUID on this page

- This is a 50 minute exam containing 5 questions, 30 points each totaling 150 points.

- Please write clearly and legibly

- Your solutions must include detailed steps and/or explanations. Do not simply state the answer

- Two A-4 sized crib sheet front and back is allowed.

- There should be 7 pages including the cover page.

Question	Points
1	
2	
3	
4	
5	
Total	

Problem 1

For the continuous time periodic signal $x(t)$ as given below

$$\sum_{k=-\infty}^{\infty} \delta(t - kT)$$

a Find the Fourier Series coefficients of $x(t)$.

b Find the Fourier Transform $X(j\omega)$ of $x(t)$.

c Sketch $x(t)$ when $T \to \infty$.

d Find the Fourier transform of the signal $x(t)$ when $T \to \infty$.

Problem 2

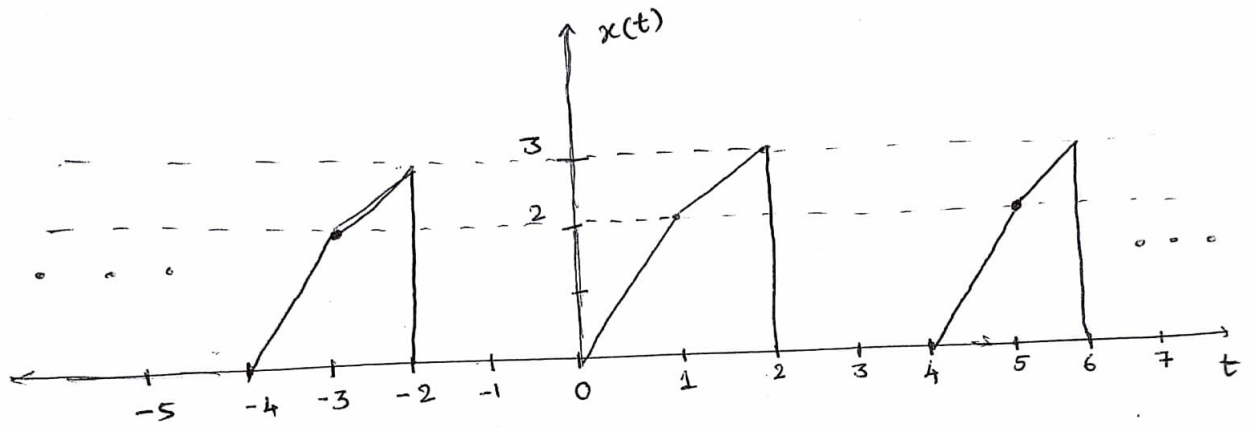Find the Fourier Transform of the signal $x(t)$ as shown in figure 1

Figure 1: x(t)

Problem 3

Consider a real periodic signal $x(t)$ with fundamental period T and Fourier series coefficients a_k. Find the following using the given information.

a Fourier Series coefficients of Even part of $x(t)$.

b Fourier Series coefficients of Odd part of $x(t)$.

c Evaluate $\displaystyle\sum_{k=-\infty}^{\infty} a_k e^{jk\frac{14\pi}{T}}$

d Evaluate $\displaystyle\sum_{k=-\infty}^{\infty} (-1)^k a_k$

Problem 4

Given $X(j\omega)$ is the Fourier transform of the continuous time signal $x(t)$. What is the Fourier transform of the signal $e^{j\omega_0 t}x(t)$?

Problem 5

Compute the Fourier Series coefficients for the following signal using the multiplication and linearity properties

$$\cos\left(\frac{3\pi n}{4} + \frac{\pi}{4}\right)\sin\left(\frac{3\pi n}{4}\right) + \sin\left(\frac{5\pi n}{3} + \frac{\pi}{4}\right)\cos\left(\frac{5\pi n}{3}\right)$$