Signals and systems
Homework #3 Part 1/2

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Spring 97-98
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Deadline : 4th Ordibehesht, 1398 [23:55]

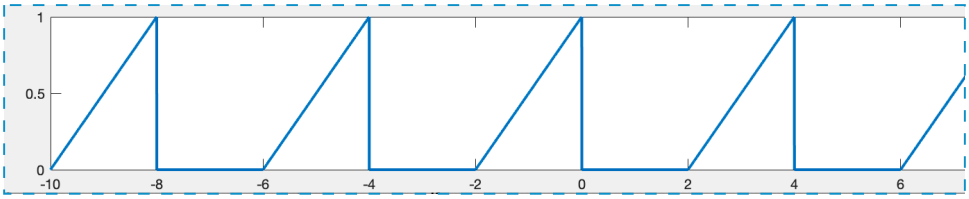
- Homeworks will not be accepted after the deadline.
- For theoretical problems, gather them in a single ***.pdf** file.
- For the matlab problems, provide both these materials:
  - **codes [*.m files]**
  - a simple **report** that includes all plots and screenshots.
- Notice that the homeworks will be **checked by plagiarism detectors**, avoid any similarities.
- Matlab problems and theoretical problems will be graded seperately (both will be graded out of 100), but their weights may be different and is determined by the course professor.

Question 1 (10 points)

determine the fourier series coefficients for the following periodic signals :

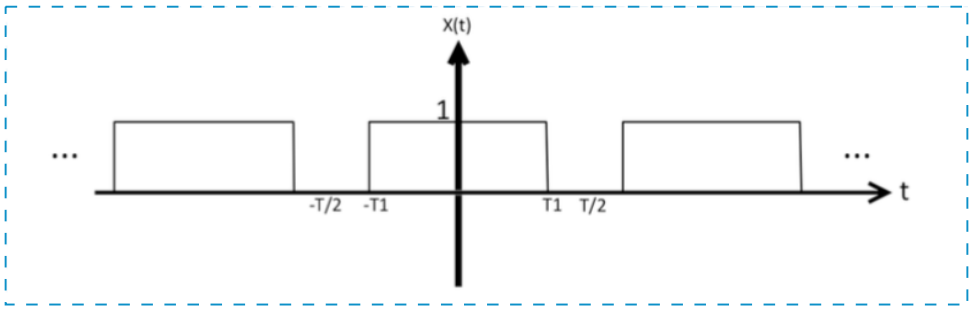
[a] $x\left(t\right) = 2\cos\left(\frac{2\pi t}{3} + \frac{\pi}{6}\right)$

[b]



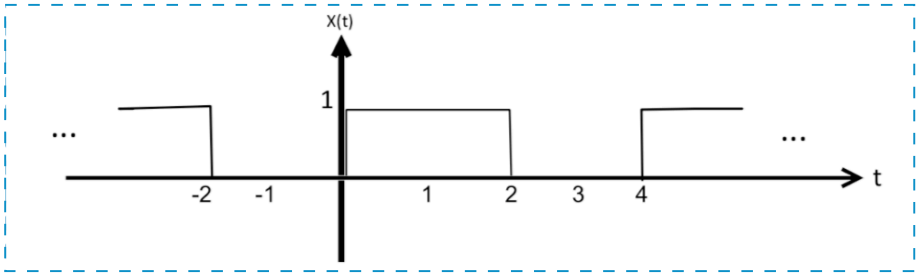
Question 2 (20 points)

[a] determine the Fourier series coefficients of the following signals

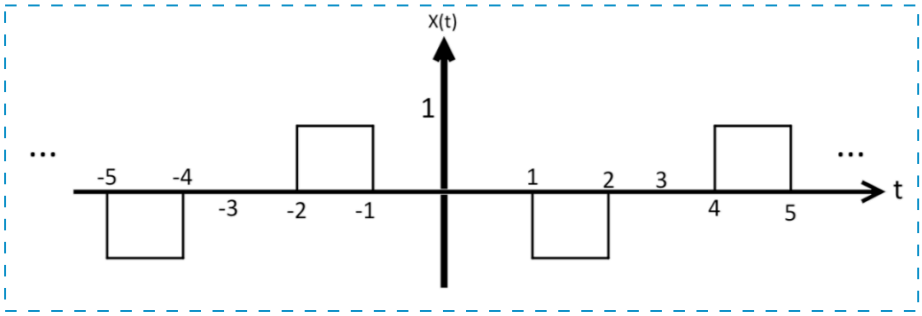


using the results of part a and fourier series charasteristics, determine the fourier series of the folowing signals :

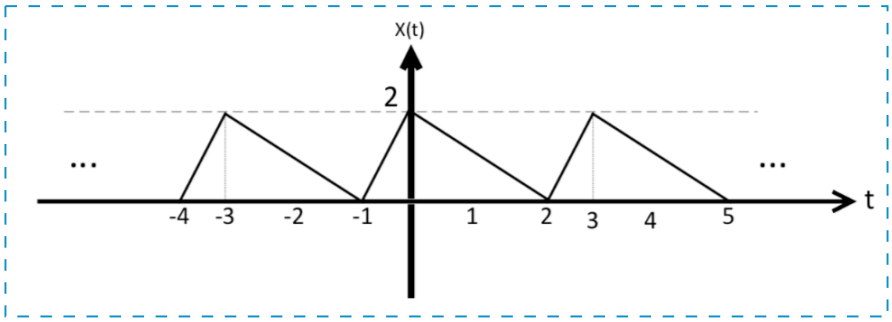
[b]



[c]



[d]

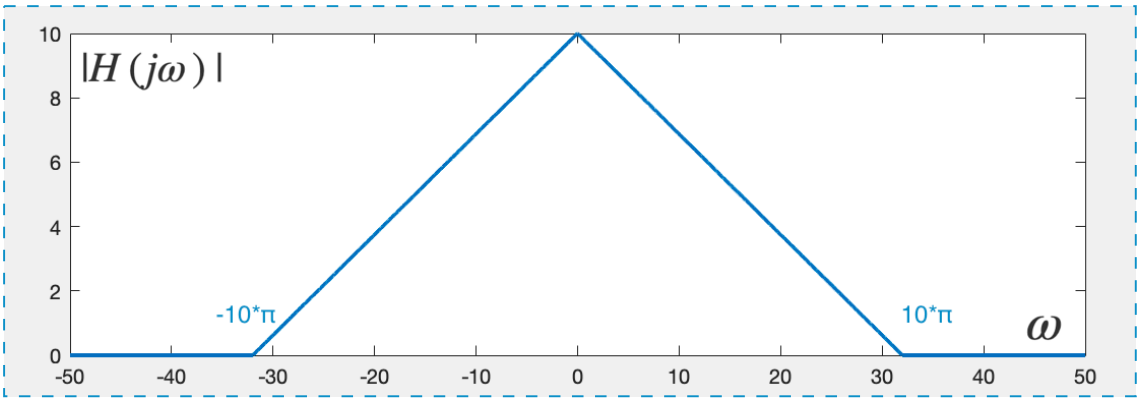


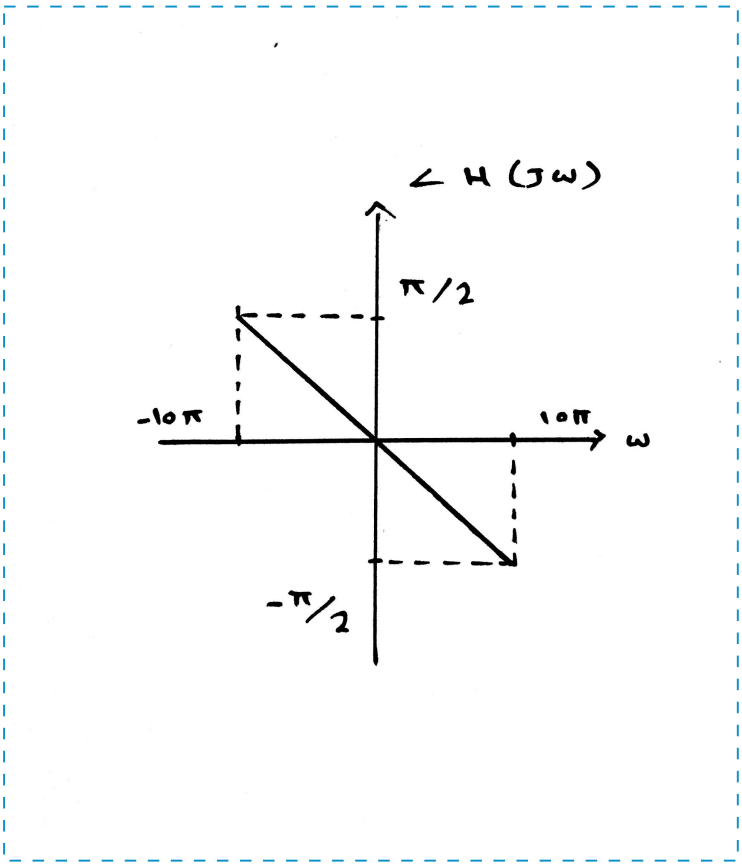
Question 3 (10 points)

Imagine x(t) is a periodic signal with fundamental period of $T_0 = \frac{1}{2}$ and Fourier series coefficients of $a_0 = 1,\ a_1 = a_{-1} = \frac{1}{2},\ a_2 = a_{-2} = \frac{1}{4}\ and\ a_k = 0\ for\ |k| > 2.$

We apply this signal to a system with following frequency response $H(j\omega)$

Determine the output.





Question 4 (10 points)

Imagine the Fourier series of signal x(t) is $x\left(t \right) = \sum_{k=-\infty}^{+\infty} \frac{1}{2^{|k|}} e^{j2k\pi t}$

Determine the power of output signal if we apply x(t) to a system with the following frequency response