Automatic Control and Robotics

full-time 1st degree studies, sem. 2, 2020/21

SIGNALS & DYNAMIC SYSTEMS

colloquium on the tutorials

first attempt

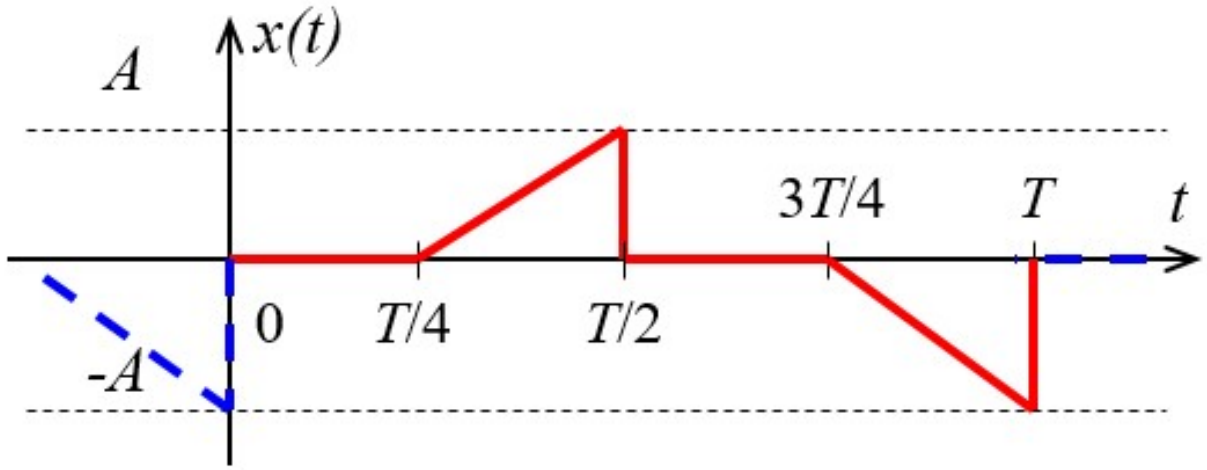
Retake colloquium (THE LAST ONE): JUNE 8

Task 1 - 6 pts

For the periodic signal $x(t)$ from the figure, determine:

a) average value,
b) energy,
c) power,
d) RMS value,
e) shape factor.

Take for the calculations $A = \sqrt{24}$.



Period of the periodic function.

Task 2 - 8 pts

Random signal $y(t) = x(t) + n(t)$, where $x(t)$ and $n(t)$ are statistically independent signals and both have uniform probability density function.

Data:

- $x(t)$ signal values are in the range $x(t) \in (0, 12)$,
- $\mu_y = \mathrm{E}[y(t)] = 7$,
- $P_y = E[y^2(t)] = 61\ \frac{1}{3}$.

Calculate parameters of $p_n(n)$ - uniform probability density functions and draw it.

Task 3 - 6 pts

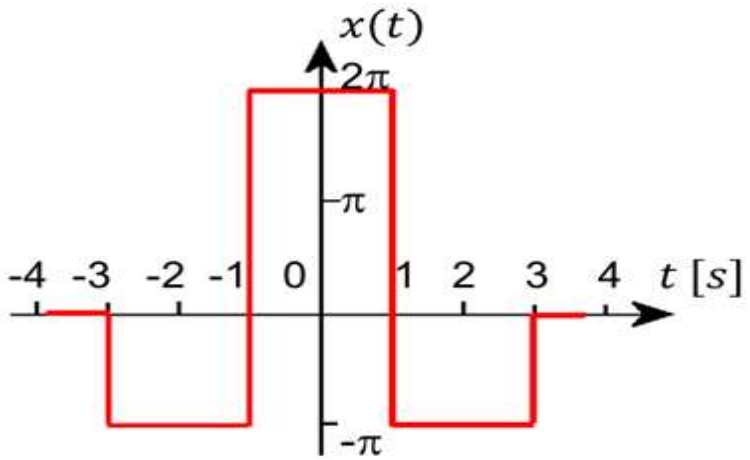
For the signal from the figure below calculate:

a) Fourier transform $X(\mathrm{j}\omega)$,

b) frequencies f_{zk} on Hz, for which $|X(\mathrm{j}2\pi f_{zk})| = 0$,

c) value of $|X(\mathrm{j}\omega)|$ for $f_1 = {}^1/_8$ Hz,

d) value of $\arg\{X(\mathrm{j}\omega)\} = \varphi(\omega)$ for $f_1 = {}^1/_8$ Hz.



POINTS	GRADE
UP TO 10	2,0
10 – 12	3,0
12 – 14	3,5
14 – 16	4,0
16 – 18	4,5
18 – 20	5,0