

Automatic Control and Robotics
full-time 1st degree studies, sem. 2, 202/21

SIGNALS & DYNAMIC SYSTEMS

Retake colloquium on the tutorials
(second and last attempt)

Task 1 – 7 pts

For the periodic signal $x(t)$ from the Figure 1, determine:

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

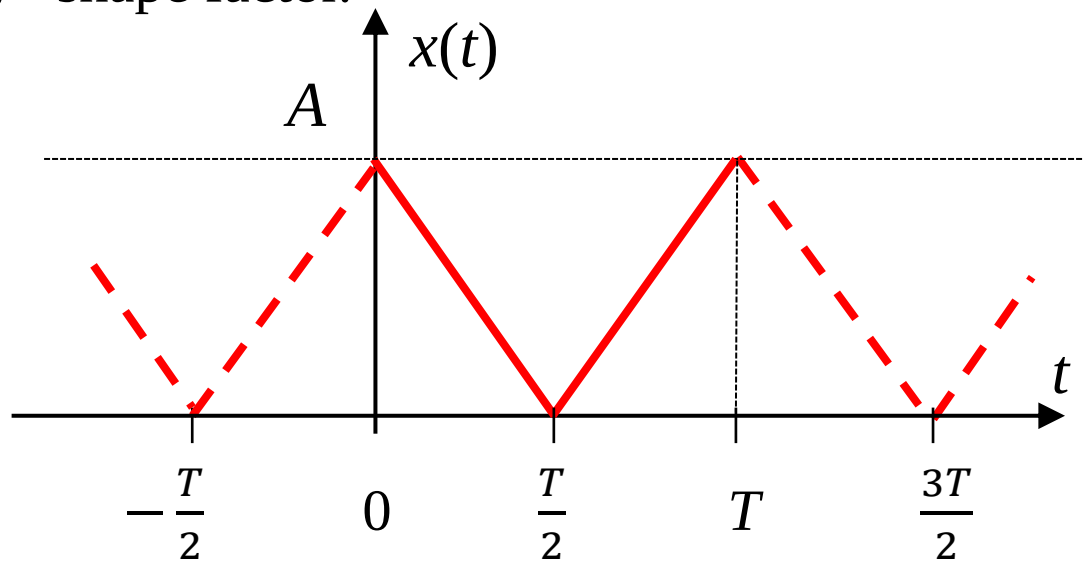


Figure 1. Periodic signal $x(t)$.

Task 2 – 8 pts

The continuous random signal $x(t)$ has a probability density distribution with the shape of two right triangles, as in Figure 2.

Calculate: $m_x = E[x(t)]$, $P_x = E[x^2(t)]$, $V[x(t)]$.

How will these values change when we shift the density plot right by constant $c > 0$?

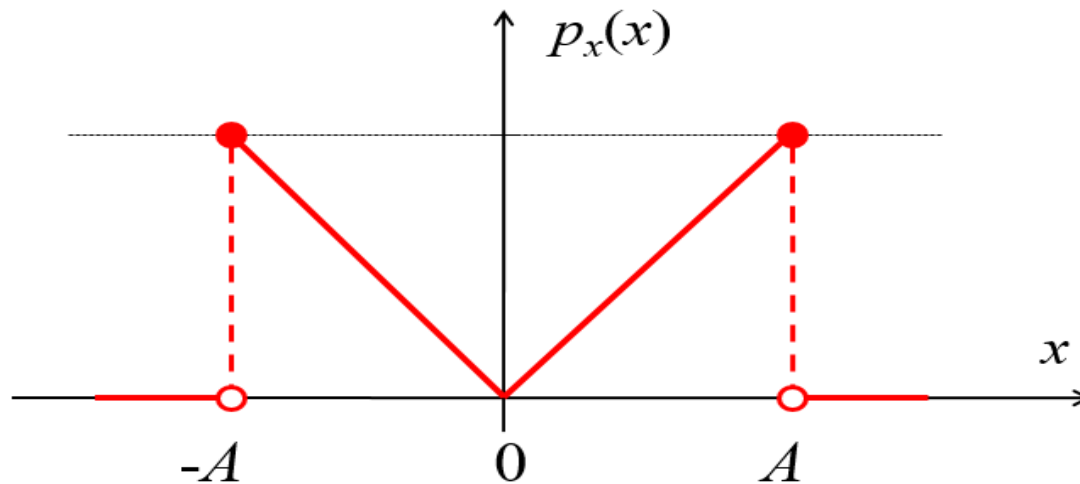


Figure 2. Probability density function (PDF).

Task 3 – 5 pts

The Figure 3 shows the pulse $x(t)$. Determine the Fourier **amplitude spectrum values** of this pulse for the frequencies $f = 0$ Hz and $f = 1$ Hz.

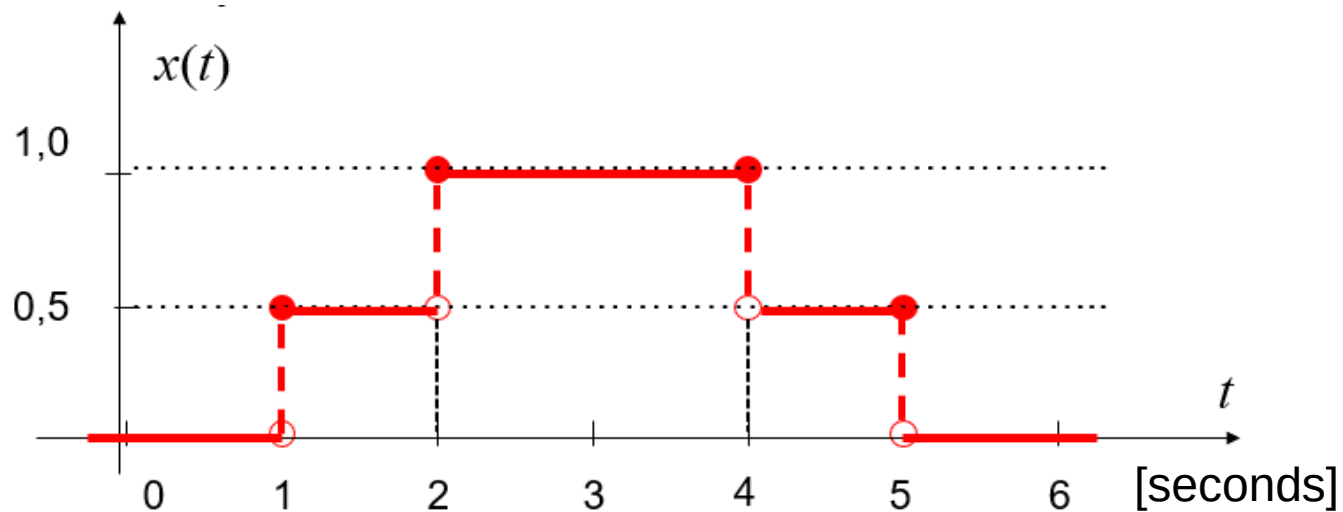


Figure 3. The analog signal (pulse) $x(t)$.

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