

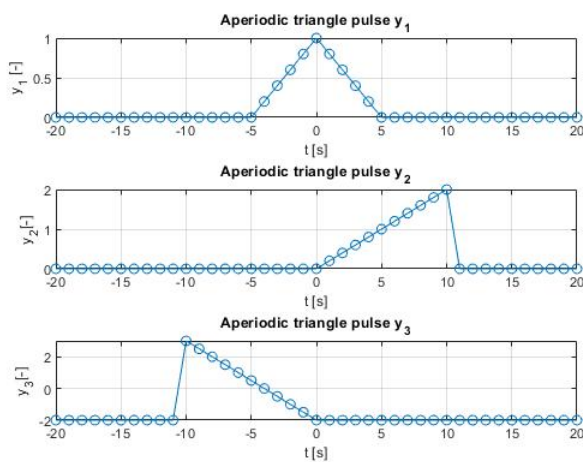
Zpracování signálů

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1 Zadání

1. Vygenerujte a vhodně zobrazte aperiodické trojúhelníkové signály y_1 , y_2 a y_3 který jsou definovány pro čas $t \in [-20; 20]$ s, $T_s = 1$ s, viz obrázek níže. Použijte funkce



2. Vygenerujte a vhodně zobrazte jednotkové impulsy $\delta_1(n)$ a $\delta_2(n)$, které jsou definovány pro vzorky $n \in [-10; 10]$ takto:

$$\delta_1(n) = \begin{cases} 1, & n = 0 \\ 0, & n \neq 0 \end{cases} \quad \delta_2(n - 5) = \begin{cases} 1, & n = 5 \\ 0, & n \neq 5 \end{cases}$$

3. Vygenerujte a vhodně zobrazte jednotkové skoky $u_1(n)$ a $u_2(n)$, které jsou definovány pro vzorky $n \in [-20; 20]$ takto:

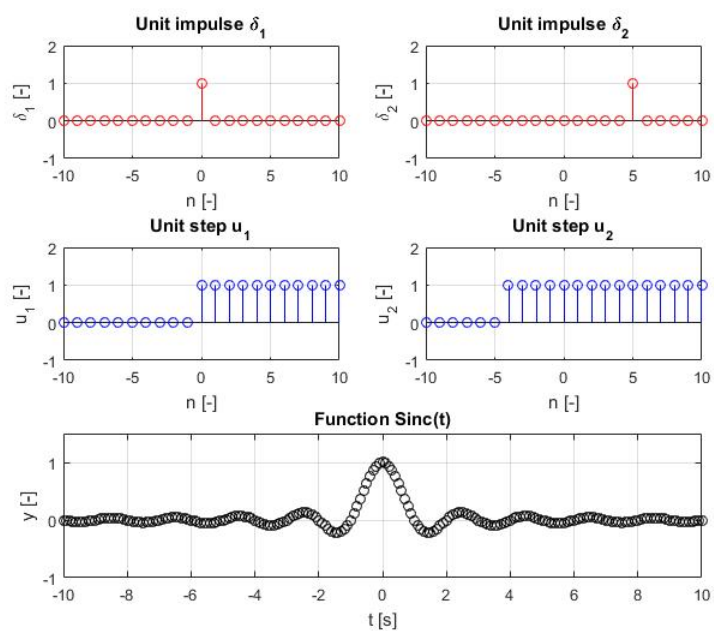
$$u_1(n) = \begin{cases} 1, & n \geq 0 \\ 0, & n < 0 \end{cases} \quad u_2(n + 4) = \begin{cases} 1, & n \geq -4 \\ 0, & n < -4 \end{cases}$$

4. Vygenerujte a vhodně zobrazte průběh funkce $y(t) = \text{sinc}(t)$ pro interval $t \in [-10; 10]$ s.

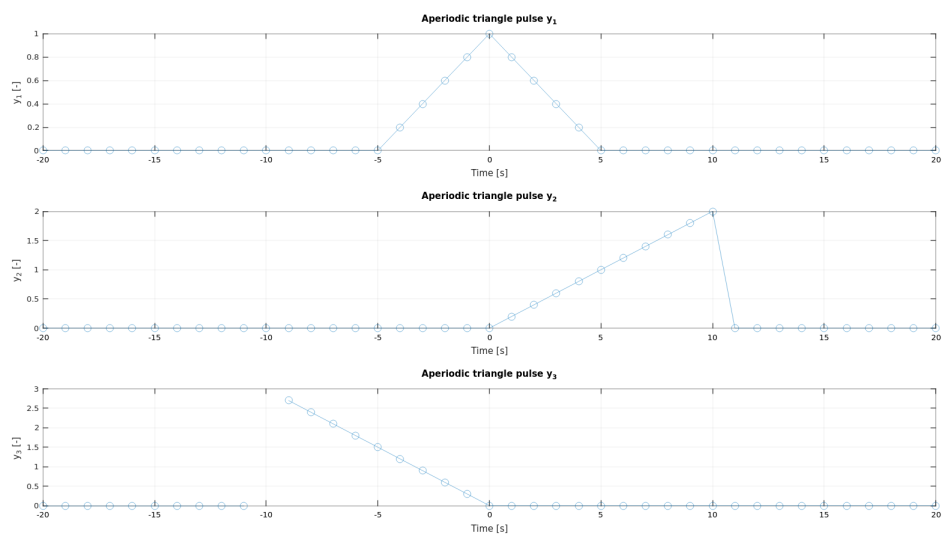
$$\text{sinc}(t) = \begin{cases} 1, & t = 0 \\ \frac{\sin(t\pi)}{t\pi}, & t \neq 0 \end{cases}$$

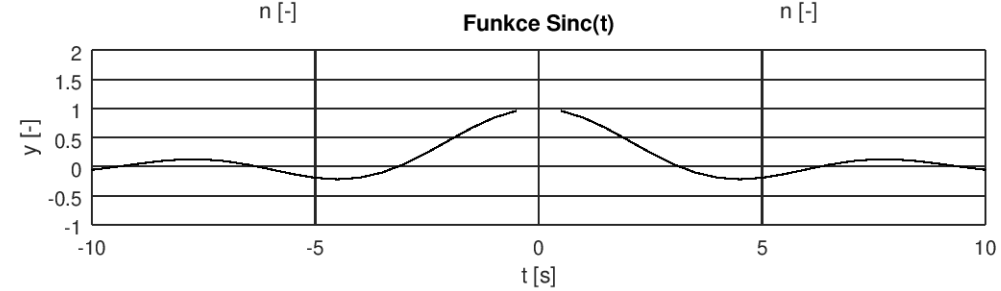
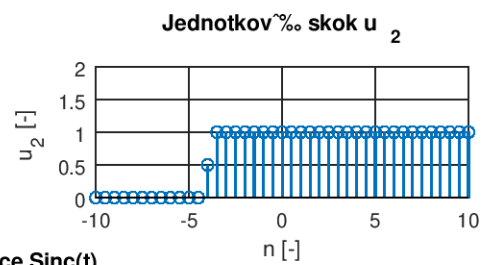
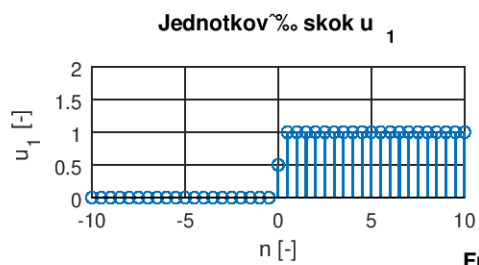
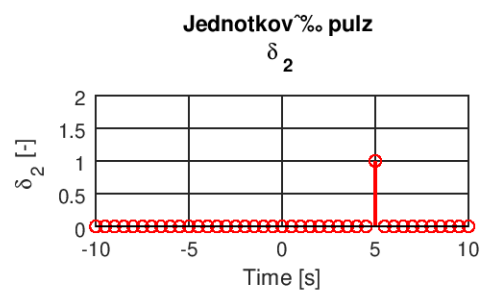
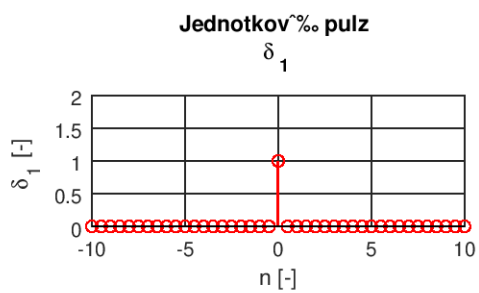
4. Vygenerujte a vhodně zobrazte průběh funkce $y(t)=\text{sinc}(t)$ pro interval $t \in [-10; 10]$ s.

$$\text{sinc}(t) = \begin{cases} 1, & t = 0 \\ \frac{\sin(t\pi)}{t\pi}, & t \neq 0 \end{cases}$$



2 Vypracování





3 Kód

../code/signal_gen_p2.m

```
1 clear all;
2 Ts = 1 %perioda;
3 T_sig = 10;
4 t = -20:(1/Ts):20;
5
6 y1 = tripuls(t,T_sig);
7 y2 = 2*tripuls(t-5,T_sig,1);
8 y3 = 3*tripuls(t+5,T_sig,-1);
9
10 figure(1);
11 subplot(311);
12 plot(t,y1,'-o-');
13
14 title("Aperiodic_triangle_pulse_y_1");
15 xlabel('Time[s]');
16 ylabel('y_1[-]');
17 set(gca,'xtick',-20:5:20);
18 grid on;
19
20 subplot(312);
21 plot(t,y2,'-o-');
22
23 title("Aperiodic_triangle_pulse_y_2");
24 xlabel('Time[s]');
25 ylabel('y_2[-]');
26 set(gca,'xtick',-20:5:20);
27 grid on;
28
29 subplot(313);
30 plot(t,y3,'-o-');
31
32 title("Aperiodic_triangle_pulse_y_3");
33 xlabel('Time[s]');
34 ylabel('y_3[-]');
35 set(gca,'xtick',-20:5:20);
36 grid on;
37
38 t2 = -10:0.5:10;
39 dirac1 = dirac(t2);
40 dirac2 = dirac(t2-5);
41 heav1 = heaviside(t2);
42 heav2 = heaviside(t2+4);
43 sin_c = sin(t2)./t2;
44
45 idx1 = dirac1 == Inf; % find Inf
46 dirac1(idx1) = 1; % set Inf to finite value
47
48 idx2 = dirac2 == Inf; % find Inf
49 dirac2(idx2) = 1; % set Inf to finite value
50
51 figure(2);
52 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
53 subplot(3,2,1);
54 stem(t2,dirac1,'r','linewidth', 1);
55 axis([-10 10 0 2]);
56 grid on;
57
58 title({"Jednotkov_pulz" '\delta_1'});
59 xlabel('n[-]');
60 ylabel('\delta_1[-]');
61 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
62 subplot(3,2,2);
63 stem(t2,dirac2,'r','linewidth', 1);
64 axis([-10 10 0 2]);
65 grid on;
66
67 title({"Jednotkov_pulz" '\delta_2'});
68 xlabel('Time[s]');
69 ylabel('\delta_2[-]');
70
71 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
72 subplot(3,2,3);
```

```

73 stem(t2,heav1,'linewidth', 1);
74 axis([-10 10 0 2]);
75 grid on;
76
77 title({'\gamma Jednotkov_\text{skok}_u_1});
78 xlabel('n_{-}');
79 ylabel('u_{1_{-}}');
80 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
81 subplot(3,2,4);
82 stem(t2,heav2,'linewidth', 1);
83 axis([-10 10 0 2]);
84 grid on;
85
86 title({'\gamma Jednotkov_\text{skok}_u_2});
87 xlabel('n_{-}');
88 ylabel('u_{2_{-}}');
89
90 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
91 subplot(3,2,5:6);
92 plot(t2,sin_c,'k');
93 axis([-10 10 -1 2]);
94 grid on;
95
96 title({'Funkce_\text{Sinc}(t)'});
97 xlabel('t_{[s]}');
98 ylabel('y_{-}');

```

[Odkaz na kompetní repozitář se cvičeními](#)