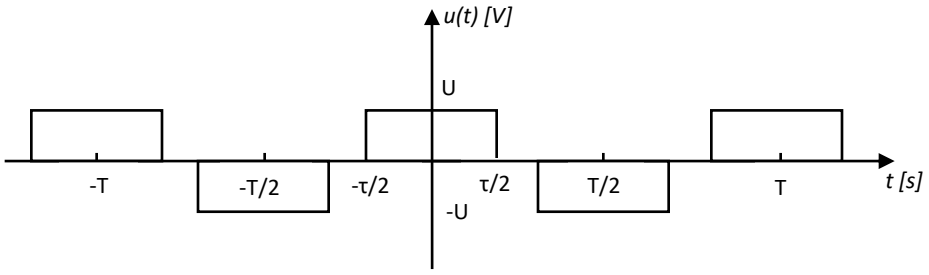
1. a) Izvesti izraz za koeficijente Furijeovog reda u kompleksnom obliku za povorku pravougaonih impulsa amplitude *U*, perioda *T* i trajanja τ.

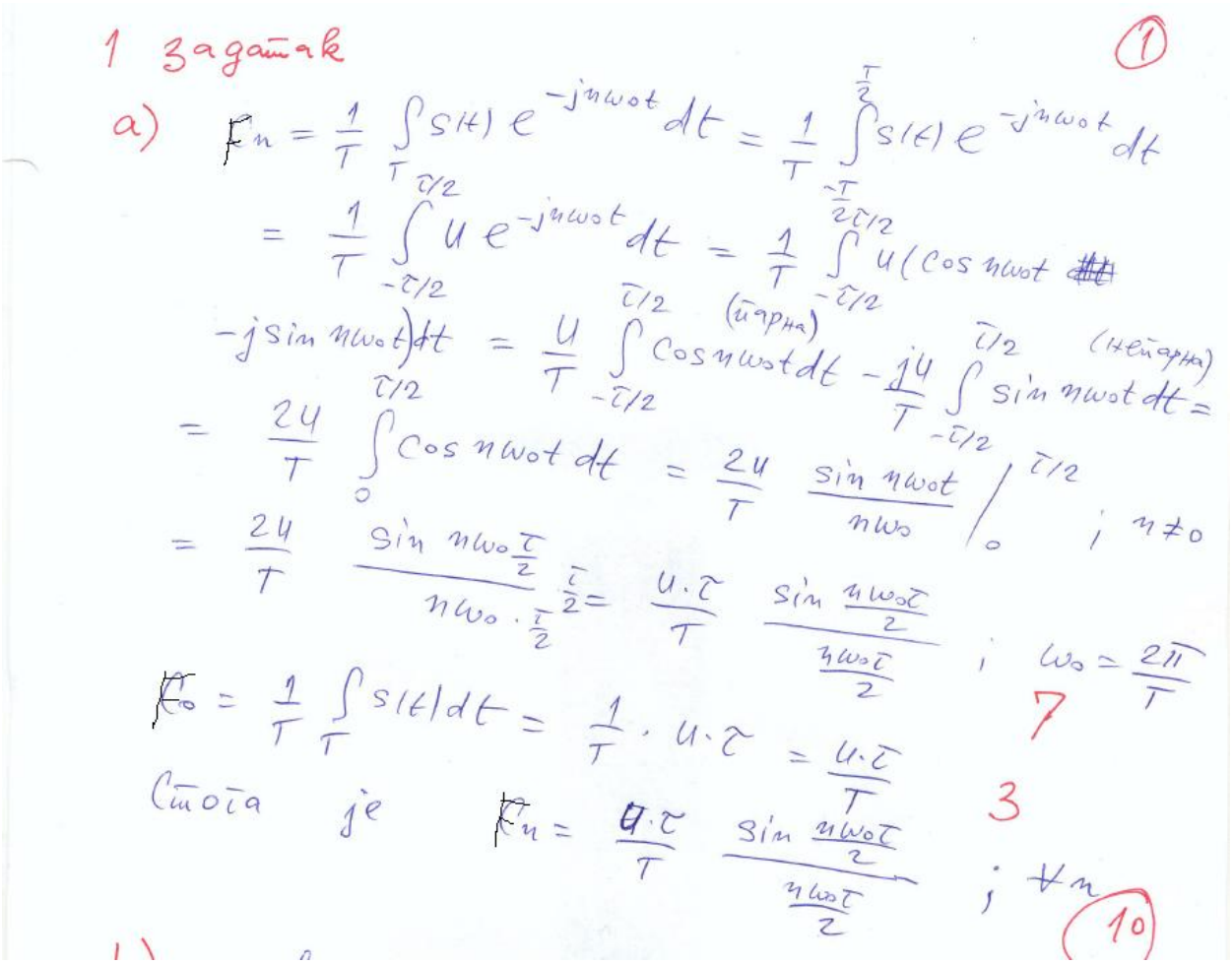
   b) Odrediti koeficijente Furijeovog reda u eksponencijalnom obliku za signal čiji je vremenski dijagram prikazan na slici 1.



slika 1

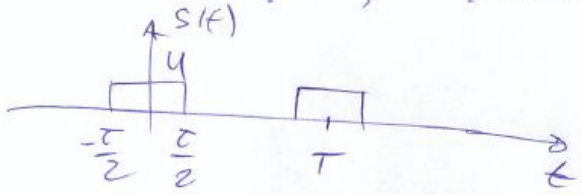
c) Za signal prikazan na slici 1 skicirati amplitudski spektar za *T=1, τ=0.2 i U=1*.

Rješenje:



b)

b) ako je $s(t)$ povorka pravougaonih impulsa pod a) (amplituda U)



$u(t) = s(t) - s(t - \frac{\tau}{2})$ $\quad T > \tau$

$$\underline{F}_n = \underline{F}_{n1} - \underline{F}_{n1} e^{-jn\omega_0 \cdot \frac{\tau}{2}}$$

$$= \underline{F}_{n1}\left(1 - e^{-jn \cdot \frac{2\pi}{T} \cdot \frac{\tau}{2}}\right)$$

$$= \underline{F}_{n1}\left(1 - e^{-jn\pi}\right) = \underline{F}_{n1}\left(1 - (-1)^n\right)$$

$$= \begin{cases} 2\underline{F}_{n1}, & n \text{ neparno} \\ 0, & n \text{ parno} \end{cases}$$

(kašnjenje, povezano na vježbama)

(može i direktno iz formula)

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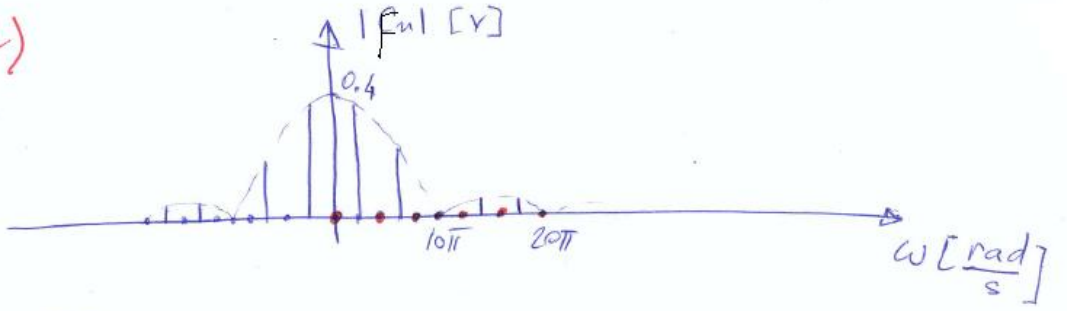
c)

c)



$\frac{U \cdot \tau}{T} = 0.2$

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Postoje samo komponente na učestanostima (uočenim) $(2k+1)\frac{2\pi}{T}$