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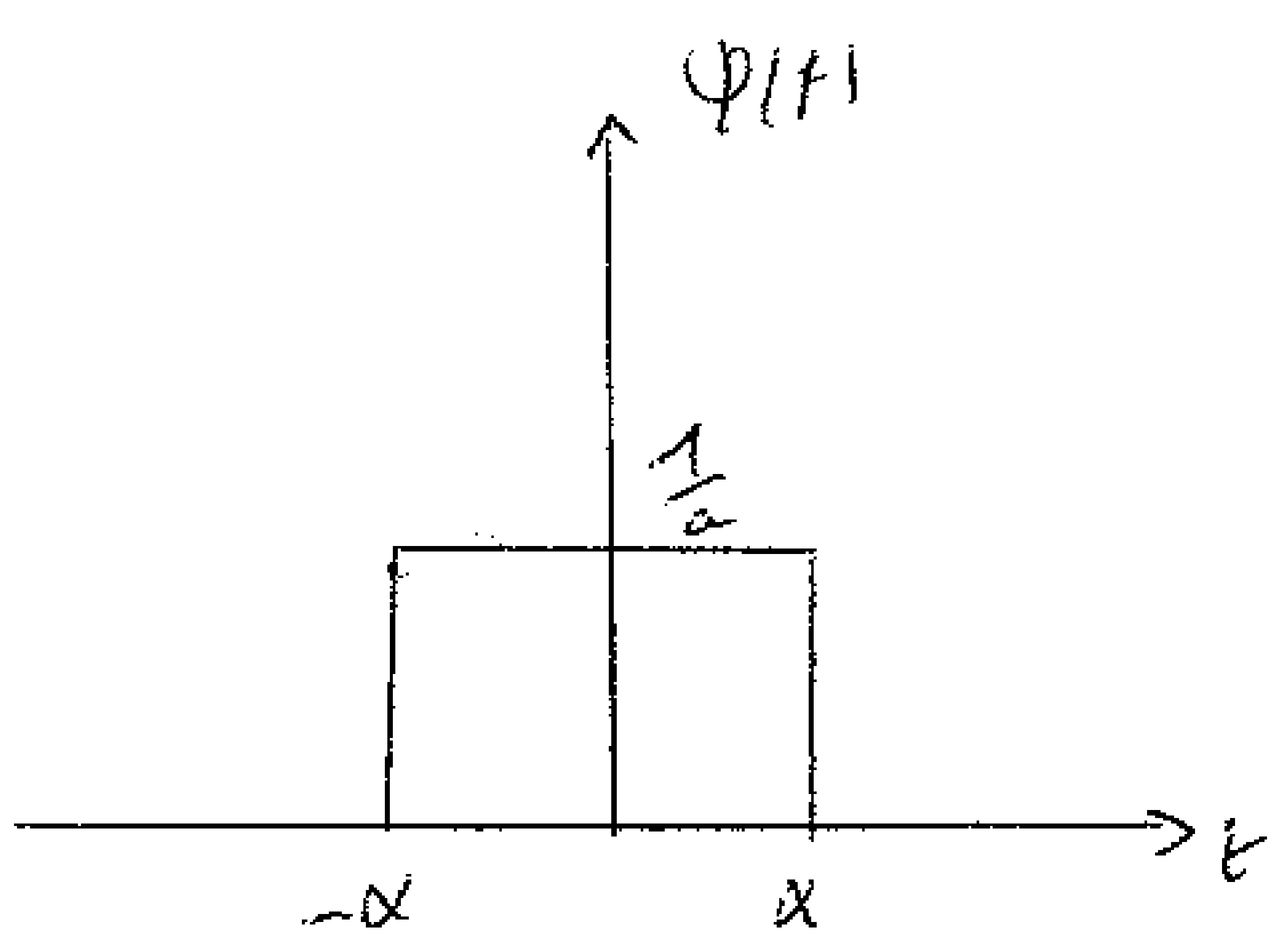
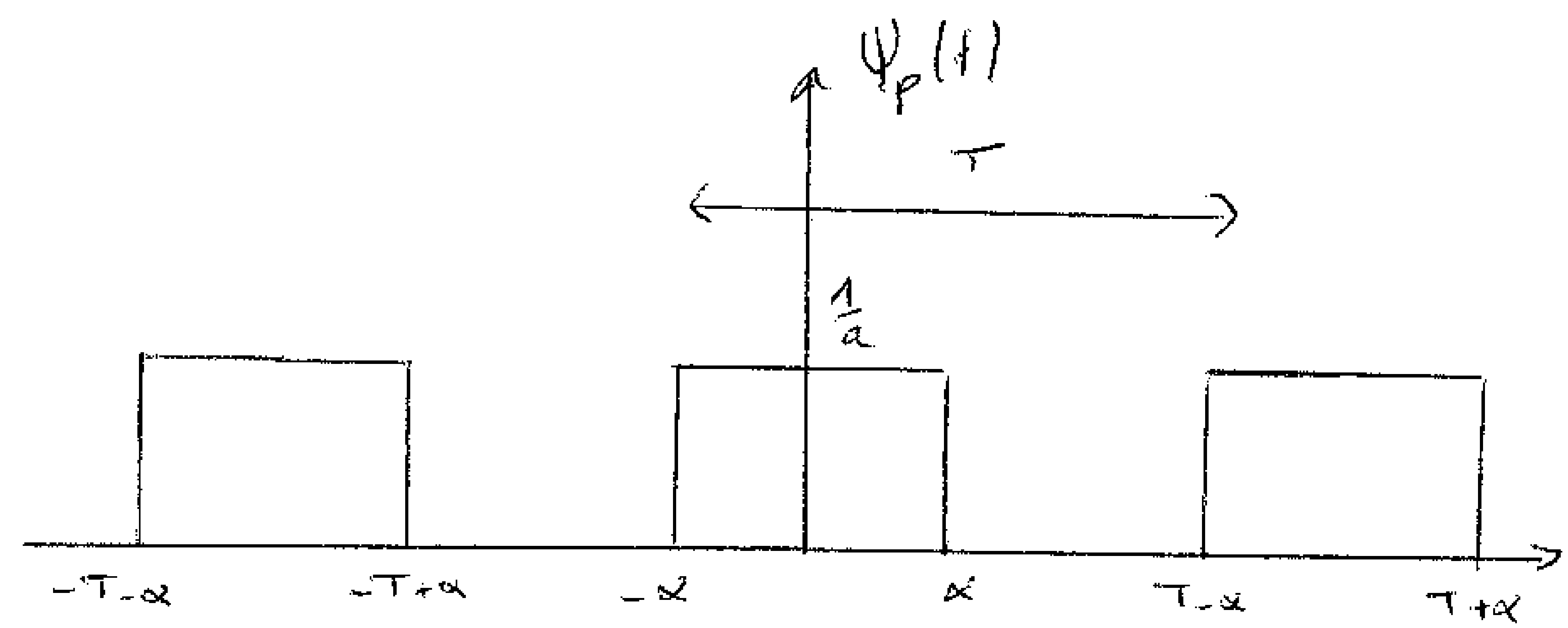
① Signal borné en temps et amplitude → Energie finie

② $\Psi(f) = \int_{-\infty}^{\infty} \psi(t) \cdot e^{-2j\pi f t} dt = \frac{1}{a} \int_{-\alpha}^{\alpha} e^{-2j\pi f t} dt = \frac{1}{a} \cdot \frac{-1}{2j\pi f} \left[e^{-2j\pi f t} \right]_{-\alpha}^{\alpha}$

$= \frac{-1}{2aj\pi f} \left[e^{-2j\pi f \alpha} - e^{2j\pi f \alpha} \right] = \underline{\frac{1}{a\pi f} \sin(2\pi f \alpha)}$.

③ $\psi_p(t) = \psi(t) * \sum_{k=-\infty}^{\infty} \delta(t - kT)$ PÉRIODISATION





④ $\Psi_p(f) = TF(\psi_p(t)) = TF(\psi(t)) . TF\left(\sum_{k=-\infty}^{\infty} \delta(t - kT)\right) = \frac{1}{a\pi f} \sin(2\pi f \alpha) . \sum_{k=-\infty}^{\infty} \delta\left(f - \frac{k}{T}\right)$

⑤ La periodisation en temps (periode T) devient une discrétisation en fréquence tous les $\frac{k}{T}$.