

(1) (4 pts) Determine whether each of the following random signals exists or not. If it exists, provide an example of one. If it does not exist, explain why. (i) A SSS deterministic signal which has energy 3.5, (ii) A discrete-time continuous-amplitude non-Gaussian WSS signal which has psd  $\Phi_X(f) = 1$ .

(2) (6 pts) Let  $\{X_n\}$  be a SSS first-order autoregressive source:

$$X_n = 0.9X_{n-1} + W_n, \quad \forall n,$$

where  $\{W_n\}$  is i.i.d. Gaussian with zero mean and unit variance. The random variable  $W_n$  is independent of  $X_{n-1}, X_{n-2}, X_{n-3}, \dots$ . Determine the mean, autocorrelation function and psd of  $\{X_n\}$ .