

EE 545: Homework 1

1. Given a the following random process

$$X(t) = A \cos(2\pi f_0 t + \Theta) \quad (1)$$

where f_0 is a constant and Θ is a random variable with the following pdf

$$f_{\Theta}(x) = \begin{cases} \frac{1}{2\pi}, & |\theta| \leq \pi \\ 0, & \text{otherwise.} \end{cases} \quad (2)$$

Compute the power spectral density using

$$S_X(f) = \lim_{T \rightarrow \infty} \frac{|\mathcal{F}\{X_T(t, \zeta_i)\}|^2}{T} \quad (3)$$

2. Answer the following problems from the book.

- 2.33
- 2.35
- 2.39
- 2.42