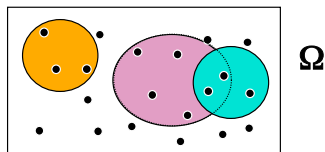


Lecture 9 Outline

- Probability Theory
- Probability Measure
- Conditional Probability and Independence
- Random Variables
- Cumulative Distribution Function (PDF)
- Probability Density Function (pdf)

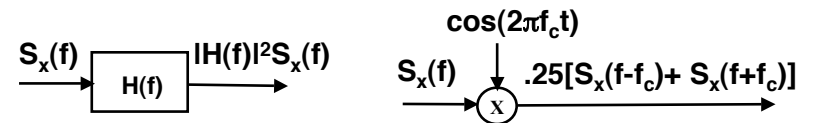
Probability Theory

- Mathematically characterizes random events.
- Defined on a probability space: (Ω, \mathcal{E}, P)
 - Sample space of possible outcomes.
- Sample space has a subset of events
- Probability defined for these subsets.



Review of Last Lecture

- PSD Properties
- Modulation and Filtering of Power Signals



- Autocorrelation of Power Signals
- PSD and Autocorrelation of Periodic Signals
 - PSD is discrete, so autocorrelation is periodic
- Random signals analyzed by PSD/autocorrelation

Probability Measure

- $P(\Omega)=1$
- λ $0 \leq P(A) \leq 1$ for all events A
- λ If $(A \cap B) = \emptyset$ then $P(A \cup B) = P(A) + P(B)$.

Usually describe P by sums or integrals

Main Points

- Random events defined on a probability space, with events as subsets and a probability measure.
- Probability measure defined by axioms, like sums or integrals.