EMD 538 - Lecture 01

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Probability Distributions

- Discrete versus continuous etc
- PDF vs CDF
  - PDFs (for discrete it's a mass function) and is the probability that the variable X takes on exactly some value x
    - goes to 0 as x -> ∞
  - CDF is the probability that the random variable X is less than or equal to some value x
    - goes to 1 as x -> ∞
  - the integral of the PDF gives us the CDF
  - Notation:

$$F(x) = \int_{-\infty}^{x} f(u)du$$

Discrete Probability Distributions

- Bernoulli
- Binomial
- Multinomial

  - probability of exactly x_i outcomes of type i in n independent trials, where p_i is the probability of success in a single trial of type i
  - *this is a generalization of the bernoulli distribution for more than 2 possible outcomes*

- Geometric
- Negative Binomial
- Poisson

Normal Distribution

- Normal (Gaussian)
- Exponential
  - distribution of time between events occuring independently at a constant rate λ
- Gamma
  - distribution of time required for exactly r events to occur assuming events take place at a constant rate λ (generalization of the exponential).