Mathematical Notation

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February 9, 2015

PROBABILITY NOTATION

1. **X:** a Random Variable(RV). It is a Set.

2. **Probability of happening k:** $\mathbb{P}(X = k)$

3. **Probability of not happening k:** $\mathbb{P}(X = k')$

4. **Pdf:** $\mathbb{P}(X = x) \sim P_X(x)$

5. **Cdf:** $\mathbb{P}(X \leq x) \sim F_X(x)$

6. **Joint Pdf:** $\mathbb{P}\left(\bigcap_{i=1}^{n}(X_i = x_i)\right) \sim P_{X_1, X_2, \cdots, X_n}(x_1, x_2, \cdots, x_n)$

7. **Joint Union:** $\mathbb{P}\left(\bigcup_{i=1}^{n}(X_i = x_i)\right) \sim U_{X_1, X_2, \cdots, X_n}(x_1, x_2, \cdots, x_n)$

8. **Expected Value of X:** $E[X]$

9. **Expected value of kth power of X:** $E\left[X^k\right]$

10. **Variance of X:** $\sigma^2[X]$

11. **Standard deviation of X:** $\sigma[X]$

12. **Pdf with given parameter Theta :** $P_{X_1, X_2, \cdots, X_n}(x_1, x_2, \cdots, x_n; \Theta_i)$

13. **Conditional Probability:** $P_{X_1, X_2, \cdots, X_n, Y_1, Y_2, \cdots, Y_n}(x_1, x_2, \cdots, x_n \mid y_1, y_2, \cdots, y_n)$

FORMULA

1. Suppose $\Omega = \{\text{set of all possible mutually exclusive outcomes}\}, E \subseteq \Omega$