Project 2 Formula Sheet

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1. Tchebysheff's theorem – P(|Y- μ |>=k σ)<=1/(k^2)
2. Properties of the mean and variance of binomial and Poisson distributions: E(X) = np and Var(X) = np(1-p) for the binomial distribution, and E(X) = λ and Var(X) = λ for the Poisson distribution.
3. Cumulative distribution function (CDF) for a discrete random variable X: F(x) = P(X ≤ x) = ∑f(x\_i) for all x\_i ≤ x.
4. Mean of a discrete random variable X: E(X) = ∑x\_i f(x\_i).
5. Variance of a discrete random variable X: Var(X) = E(X^2) - [E(X)]^2, where E(X^2) = ∑x\_i^2 f(x\_i).
6. Probability density function for continuous random variable X: f(x) such that the area under the curve between any two values a and b is the probability that X lies in the interval [a, b]: P(a ≤ X ≤ b) = ∫a^b f(x) dx.
7. Cumulative distribution function (CDF) for a continuous random variable X: F(x) = P(X ≤ x) = ∫-∞^x f(x) dx.
8. Variance of a continuous random variable X: Var(X) = E(X^2) - [E(X)]^2, where E(X^2) = ∫-∞^∞ x^2 f(x) dx.
9. The standard normal distribution, which is a normal distribution with μ=0 and σ=1.
10. Joint probability distribution for two discrete random variables X and Y: P(X=x, Y=y) = f(x,y), where f(x,y) is the probability that X takes on the value x and Y takes on the value y.
11. Marginal probability distribution of X for two discrete random variables X and Y: P(X=x) = ∑y f(x,y) for all y.
12. Conditional probability distribution of X given Y for two discrete random variables X and Y: P(X=x | Y=y) = f(x,y) / P(Y=y) for all y such that P(Y=y) > 0.
13. Joint probability distribution for two continuous random variables X and Y: f(x,y) such that the double integral of f(x,y) over the entire plane is 1.
14. Marginal probability distribution of X for two continuous random variables X and Y: f\_X(x) = ∫ f(x,y) dy over the entire range of y.
15. Conditional probability distribution of X given Y for two continuous random variables X and Y: f(x|y) = f(x,y) / f\_Y(y) for all y such that f\_Y(y) > 0.
16. The binomial distribution, which models the number of successes in a fixed number of independent trials, each with the same probability of success p. The probability of exactly k successes in n trials is given by the PMF: P(X=k) = (n choose k) \* p^k \* (1-p)^(n-k), where (n choose k) = n! / (k!(n-k)!) is the binomial coefficient.