

Week 10 Recap

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0.1 CDF Method of Finding PDF of a Function of a Random Variable

Given that $Y = g(X)$, where X is some random variable.

1. Determine the possible value of Y based on the values of X and the function g .
2. Begin with the cdf $F_Y(y) = P(Y \leq y) = P(g(X) \leq y)$. Express the cdf in terms of the original random variable X .
3. From $P(g(X) \leq y) = P(X \leq g^{-1}(y))$.
4. Differentiate with respect to y to obtain the density $f_Y(y)$.

0.2 Method of Transformations to Find PDF of Function of a Random Variable

- If $g(X)$ is monotonic (i.e. either strictly increasing or decreasing over the range of X) so it is invertible with inverse function $X = g^{-1}(Y)$, then:

$$f_Y(y) = f_X(g^{-1}(y)) \left| \frac{d}{dy} g^{-1}(y) \right|$$