

Stat 134: Section 15

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Conceptual Review

Please discuss these short questions with those around you in section. These problems are intended to highlight concepts from lecture that will be relevant for today's problems.

- a. What is the moment generating function of a random variable X ?
- b. How do we get the k_{th} moment of X from MGF of X ?
- c. Does MGF uniquely define a distribution? Does MGF always exist?

Problem 1

Suppose $X \sim N(\mu, \sigma^2)$. Find the moment generating function of X , $M_X(t)$.

Problem 2

Let $X \sim \text{Binom}(n, p)$

- a. Find the moment generating function of X , $M_X(t)$.
- b. Use (a) to find $\mathbb{E}(X)$.

Problem 3

Suppose X has the moment generating function $M_X(t)$ and define $K(t) := \log M_X(t)$. Prove that $K(0), K^{(1)}(0), K^{(2)}(0)$ are $0, \mathbb{E}(X), \text{Var}(X)$