

Math 342 —Moment generating functions

Problem 1. Let $X \sim \text{Ber}(p)$. Find the moment generating function of X and the first three moments of X .

Problem 2. Let $Y \sim \text{Bin}(n, p)$. Use the moment generating function you found in Problem 1 to find the moment generating function of Y . Remember that $Y = X_1 + X_2 + \cdots + X_n$ where $X_1, X_2, \dots, X_n \sim \text{Ber}(p)$ are i.i.d.

Problem 3. Let $Y \sim \text{Bin}(n, p)$ and $Z \sim \text{Bin}(m, p)$ be independent random variables. Use the moment generating function you found in Problem 2 to find the moment generating function of $Y + Z$ and then determine the distribution of $Y + Z$, including any relevant parameters.