

Homework 3

1. A random variable X has the moment generating function $\psi(t) = \frac{1}{1-t}$ defined for any $t < 1$. What is the probability $P(X < 1)$?
2. Suppose X and Y are independent random variables and $X \sim G(\alpha, \lambda)$, $Y \sim G(\beta, \lambda)$. Find the distribution of $X + Y$ using moment generating functions.
3. Suppose $X \sim G(\alpha, \lambda)$. Find the expected value $E\left(\frac{1}{X}\right)$.
4. Let $Z \sim N(0, 1)$. Find $P\left(0.5 < \left|Z - \frac{1}{2}\right| < 1.5\right)$.