Lecture 23

10.4

Random Sums

Thm: Wald's Identity

Let N be a non-negative integer valued RV.

Let $X_1, X_2, \ldots$ be iid RV with finite mean

Let $X_i \perp\!\!\!\perp N$

- $S_N = X_1 + \ldots + X_N = \sum_{i=1}^{N} X_i$

$$\Rightarrow E(S_N) = E(N) \cdot E(X_i)$$

Pf

$$E(S_N \mid N=n) = n\mu$$

so $E(S_N) = E\left(E(S_N \mid N)\right) = E(N\mu) = E(N)\mu$