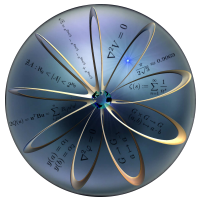

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Wald's equation

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Let $X_1, X_2, \ldots, X_N$ be a sequence of N iid random variables distributed as random variable X, such that

1. $N > 0$ is itself a random variable (integer-valued),
2. the expectation of X, $\mathrm{E}[X] < \infty$, and
3. $\mathrm{E}[N] < \infty$.

Then

$$\mathrm{E}\Big[\sum_{i=1}^{N} X_i\Big] = \mathrm{E}[N]\,\mathrm{E}[X].$$

The integer N from above can be viewed as a stopping time for the stochastic process $\{X_i \mid i \in \mathbb{Z}^+\}$.