

Applied Stochastic Models (SS 08)

Problem Set 4

Problem 1

Find the mean and variance of the Weibull distribution with hazard rate (or failure rate)

$$r(t) = \frac{f(t)}{1 - F(t)} = \lambda\alpha(\lambda t)^{\alpha-1}, \lambda > 0, \alpha > 0, t \geq 0.$$

Problem 2

Let $N(t)$ be a Poisson process, and let Y_1, Y_2, Y_3, \dots be independent and identically distributed random variables. Find the mean and variance of

$$\sum_{i=1}^{N(t)} Y_i.$$

Problem 3

Consider a homogeneous Poisson process $N(t)$ with random (and with respect to time constant) intensity λ which takes two values λ_1, λ_2 with equal probabilities. (This means that first, someone rolls the intensity according to a fair coinflip, and then generates the Poisson process with this intensity.) Find the probability generating function of $N(t)$.

Problem 4

Let the times between the events of a renewal process $N(t)$ be uniformly distributed on $(0, 1)$. Find the mean and variance of $N(t)$ for $0 < t < 1$.