

MA (ST) 413 Assignment 4

1. Suppose X is normally distributed with mean μ and variance σ^2 . Compute $E[e^{3X}]$, $E[e^{4X}]$. In addition, for $t > 0$, can you derive the formula for $M_X(t) \equiv E[e^{tX}]$? Usually $M_X(t)$ is called the moment generating function (mgf) of X .
2. A population is equally divided into three class of drivers. The number of accidents per individual driver is Poisson for all drivers.
For a driver of Class I, the expected number of accidents is uniformly distributed over $[0.2, 1.0]$.
For a driver of Class II, the expected number of accidents is uniformly distributed over $[0.4, 2.0]$.
For a driver of Class III, the expected number of accidents is uniformly distributed over $[0.6, 3.0]$.
For driver randomly selected from this population, determine the probability of zero accidents.
3. Consider an automobile insurance company. In each week, the number of claims it receives follows a Poisson distribution with a parameter $\lambda = 50$. The company is considering add a \$100 deductible to all the policies. Historic data indicate that the claims with an amount less than or equal to \$100 account for 8% of the total claims. What is the new distribution of the claims received each week under the new policies?
4. King of Fredonia drinks glasses of wine at a Poisson rate of 2 glasses per day. Assassins attempt to poison the king's wine glasses. There is a 0.02 probability that any given glass is poisoned. Assume that drinking poisoned wine is always fatal instantly and it is the only cause of death. In addition, the occurrence of poison in the glassed and the number of glassed drunk are independent events. What is the probability that the currently king survives as least 50 days?
5. The geometric distribution is the special case of the negative binomial distribution when $r = 1$. Assume the a certain type of claims in one week follows a geometric distribution with $\beta = 2.0$. What is the probability that there is at least 1 claim in a week?
6. Let N be a r.v. which follows a binomial distribution with parameters $m = 20$ and $q = 0.2$. Calculate $E[2^N]$.
7. **Loss Models** page 102, Problem 6.1.