

1. Let X_1, \dots, X_n be a random sample from $\text{Poisson}(\lambda)$.
 - (1) Find $T(X)$ such that the joint pmf of sample is $\exp[p(\lambda) + q(X) + \eta(\lambda)T(X)]$ where $\eta = \eta(\lambda)$ is a 1-1 mapping.
 - (2) Point out the distribution of $T(X)$.
 - (3) For $H_0 : \lambda = \lambda_0$ versus $H_a : \lambda \neq \lambda_0$ find a general form of α -level unbiased UMP test.
2. Consider UMP in (3) of 1 with $n = 10$, $\lambda_0 = 0.1$ and $\alpha = 0.05$.
 - (1) By the first condition on $\phi(T)$, determine the value of c_1 and the range of c_2 .
 - (2) If $c_1 = 0$ and $c_2 = 4$, find r_1 and r_2 .