STA261 L5101: Quiz 3

March 21st, 2018

Last Name:_____
First Name:_____
Student Number:_____

You may use a non-programmable calculator. Any other aids are prohibited. Use pen; questions done in pencil will be ineligible for remark requests. Circle your final answer to each question. The quiz is out of 10 points. Write all your answers on the front of the quiz; use the back for rough work. Nothing on the back will be marked.

1. (10 marks) Let $X_i \sim Poisson(\theta), i = 1 \dots n$, $\theta > 0$ be an IID random sample with

$$P(X_i = x) = \frac{\theta^x e^{-\theta}}{x!}, x = 0, 1, 2, \dots$$

We wish to test $H_0 : \theta = \theta_0$ against $H_1 : \theta \neq \theta_0$ using a likelihood ratio test.

(a) (2 marks) Is the null hypothesis simple or composite? Circle the correct answer.
   (i) Simple
   (ii) Composite

(b) (6 marks) Given that the MLE is $\hat{\theta} = \bar{X}$, find the likelihood ratio test statistic $-2 \log \Lambda$.

(c) (2 marks) What is the corresponding asymptotic distribution under the null hypothesis, including the correct degrees of freedom?