STAB57

An Introduction to Statistics

Midterm 信息：

Date: Friday, March 01, 2024

Time: 3pm - 5pm

Room:

Room	Last Name
SW309	A-O
SW319	P-Z

Coverage: Everything taught in Week1 to Week 5.

Midterm review 安排：

Part1:2 月 24 日 [week1 - 5 知识点]

Part2:2 月 27 日[past exam]

复习建议：

1. 看完 midterm review 1 视频 --- 2/27 之间完成
2. 自己做 part2 题目再听我的讲解 --- 2 月 28 日完成
3. 做 part2 课节下给的 practice midterm(计时 1.5hrs) --- 2 月 29 日之前完成
4. 总结错题并重做至少三遍 – 3 月 1 日之前完成
5. 看教授的 lecture notes --- 3 月 1 日之前完成
6. 周课：复习周课笔记 以及讲义中出现的所有的 lecture homework

Agenda:

习题

额外录了几个卷子在 midterm review part2 课节下

21F STAB57 midterm 不做 Q3，Q4

23W STAB57 Midterm 不做 Q2b,Q4

23F STAB57 midterm 全部可以看

2022 WINTER MIDTERM

Question-1:(4 points) Suppose $X_1, X_2, \ldots, X_7 \sim N(\mu_x, \sigma^2)$ and $Y_1, Y_2, \ldots, Y_5 \sim N(\mu_y, \sigma^2)$. All the X_i 's and Y_j 's are independent (any X_i and Y_j are also independent).Using all of them (do not leave any observation out)

a) [2 points] Derive an expression of a random variable that follows a t distribution. (give the corresponding degrees of freedom)

b) [2 points] Derive an expression of a random variable that follows a F distribution. (out of the two degrees of freedoms of your F distribution, the first one can not be 1).
    (Show step by step reasoning to get the full marks).

Question-3:(4 points) Suppose X represents the proportion of allotted time a student spends while writing a quiz. Suppose the pdf of X is

$$f(x) = \frac{\Gamma(\theta + 2)}{\Gamma(\theta + 1)} x^\theta; 0 \leq x \leq 1$$

a) [2.5 points] Suppose you have n different observations (i.e. $X_1, X_2, \ldots, X_n$) which are independent. Find the method of moments estimator of θ.

b) [1.5 points] Suppose you have observed (independently) $x_1 = 0.92, x_2 = 0.79, x_3 = 0.9, x_4 = 0.65, x_5 = 0.86$. Calculate the method of moment estimate of θ.

Question-4:(4 points) Suppose $X_1, X_2, \dots, X_n$ are iid from an Exponential (λ) distribution. You want to estimate $1/\lambda$. ($1/\lambda$ is the mean of the distribution) You have the following two estimators

$$
\begin{aligned}
T_1 &= \frac{1}{n}\sum_{i=1}^{n} X_i \\
T_2 &= n * M_n
\end{aligned}
$$

(* represents multiplication)where M_n is the minimum of $X_1, X_2, \dots, X_n$. You are told that $M_n \sim$ Exponential $(n\lambda)$.

By showing a detailed comparison of the two estimators, describe which one you will prefer as an estimator of $1/\lambda$ and why.

2021 FALL FINAL

因为每年的 coverage 不一样，能找到的 week5 相关题目基本🈚️

Question-2:(7 points) Suppose a market research company is interested in the proportion of households (p) in Toronto that uses Rogers as the internet service provider(ISP).

They want to test $H_0: p = 0.3$ vs $H_1: p > 0.3$

They randomly contact 400 households and find 150 of them using Rogers as the ISP.

a) [2 points] Construct a 95% confidence interval for p.

b) [2 points] By calculating the appropriate p-value and comparing it to $\alpha = 0.05$, test the given hypothesis and comment on the conclusion that you make.

c) [3 points] Using $\frac{\hat{p}-p}{\sqrt{\frac{p(1-p)}{n}}}$ as the test statistic and by defining the rejection region under the null

hypothesis, calculate the power of the test, $H_0: p = 0.3$ vs $H_1: p = 0.4$ for sample size, $n = 400$ and $\alpha = 0.05$.