

Econ 310 Final Exam, **Part 1**: Spring 2020

4 May 2020

1. (10 points) Please state whether each of the following statements is true or false. Explain why the true statements are true. Explain why the false statements are false.
 - (a) If the formula to convert from degrees Fahrenheit to degrees Celsius is $^{\circ}C = \frac{5}{9}(^{\circ}F - 32)$ and $\bar{x}$ and s_x are the average and standard deviation of temperature in degrees Fahrenheit from a sample of 50 days, then the average and variance of temperature measured in degrees Celsius from this sample are $\frac{5}{9}\bar{x}$ and $\frac{25}{81}s_x^2$.
 - (b) For a Student's t distribution with 20 degrees of freedom, $t_{\alpha} > Z_{\alpha}$ for any $0.5 > \alpha > 0$.
2. (10 points) The GO transportation system of buses and commuter trains operates on the honor system. Train travelers are expected to buy their tickets before boarding the train. Only a small number of people will be checked on the train to see whether they bought a ticket. Suppose that a random sample of 200 train travelers was sampled and 24 of them had failed to buy a ticket. Estimate with 90% confidence the proportion of all train travelers who do not buy a ticket. Interpret the confidence interval you found.

3. (18 points) The table below contains summary statistics of measurements of the same variable for four different groups.

Statistics	1	2	3	4
n	10	10	10	10
$\bar{x}$	2	4	6	8
s^2	20	20	20	20

- (a) Write down the ANOVA table for this data, including the sum of squares, degrees of freedom, and mean square for each group.

Source of Variation	Degree of freedom	Sum of Squares	Mean Square
Treatment			
Error			
Total			N/A

- (b) Using a 5% significant level, test whether these four factor levels have the same mean or not.
4. (12 points) How long a basketball player is on the court over the course of the game depends on whether the player is a starter (begins the game on the court) or not. Let's define the events A , T_1 , T_2 , and T_3 as follows:

$$\begin{aligned}
 A &= \{\text{Playing as a starting member}\} \\
 T_1 &= \{\text{Playing for less than 16 minutes}\} \\
 T_2 &= \{\text{Playing for between 16 minutes and 32 minutes}\} \\
 T_3 &= \{\text{Playing for more than 32 minutes}\}.
 \end{aligned}$$

A basketball analyst reports the following information:

$$\begin{aligned}
 \Pr(T_1) &= 0.40 & \Pr(A|T_1) &= 0.15 \\
 \Pr(T_2) &= 0.40 & \Pr(A|T_2) &= 0.40 \\
 \Pr(T_3) &= 0.20 & \Pr(A|T_3) &= 0.80
 \end{aligned}$$

- (a) Suppose we learn that a basketball player was a starter for a game. What is the probability that this player played less than 16 minutes?
- (b) Suppose we learn that a basketball player was NOT a starter for a game. What is the probability that this player played more than 16 minutes?