

Quiz 13

True/False - No explanation needed. (2pts)

1. The degrees of freedom ν are 1 fewer than the number of measurements x_1, \dots, x_n because, even though σ_0 may be unknown, it is fixed for X , thereby yielding a quadratic relation between the x_i 's and the sample mean \bar{x} . **True/False**

sol. It is because of fixed μ_0 , not σ_0 . See HW33 T/F #5.

2. All the students should finish course evaluations. **True/False**

sol. You should!

Problems - Need justification. No justification means **zero**!

Thanos claimed that the proportion of creatures integrated when he snap his finger depends on his snapping hand - left or right. He made an infinite-gauntlet-simulator to test his claim and he got the following results from experiments.

	Disintegrated Obs. freq.	Disintegrated Exp. freq.	Survived Obs. freq.	Survived Exp. freq.	Row Total
Left hand	15	20	25	20	40
Right hand	35	30	25	30	60
Column total	50	50	50	50	100

1. What are H_0 and H_1 ? (3pts)

sol.

$$\begin{cases} H_0 : \text{hand and disintegrating probability is independent} \\ H_1 : \text{hand and disintegrating probability is dependent} \end{cases}$$

2. Fill out all the blanks in the above contingency table. (3pts)
3. Using χ^2 -independency test, draw a conclusion under $\alpha = 0.05$. You may use $\chi_{k=1}^2(r = 3.84) = 0.95$ or $\chi_{k=1}^2(r = 0.004) = 0.05$. (4pts)

sol. The χ^2 -statistic is

$$\frac{(15 - 20)^2}{20} + \frac{(35 - 30)^2}{30} + \frac{(25 - 20)^2}{20} + \frac{(25 - 30)^2}{30} = \frac{25}{6} > 3.84,$$

so we reject H_0 .