[redacted]

Sample questions for the Chi-square goodness-of-fit test

Q1: We want to see whether a dice is fair or not. We roll the dice 60 times and we obtain the following frequencies:

Ei= 60/6 =10

Number	Frequency (Oi)	Ei	(Oi - Ei)	$((Oi-Ei))^2$	$(Oi-Ei)^2/Ei$
1	8	10	-2	4	0.4
2	11	10	1	1	0.1
3	6	10	-4	16	1.6
4	9	10	-1	1	0.1
5	12	10	2	4	0.4
6	14	10	4	16	1.6

$X^2 = 4.2$

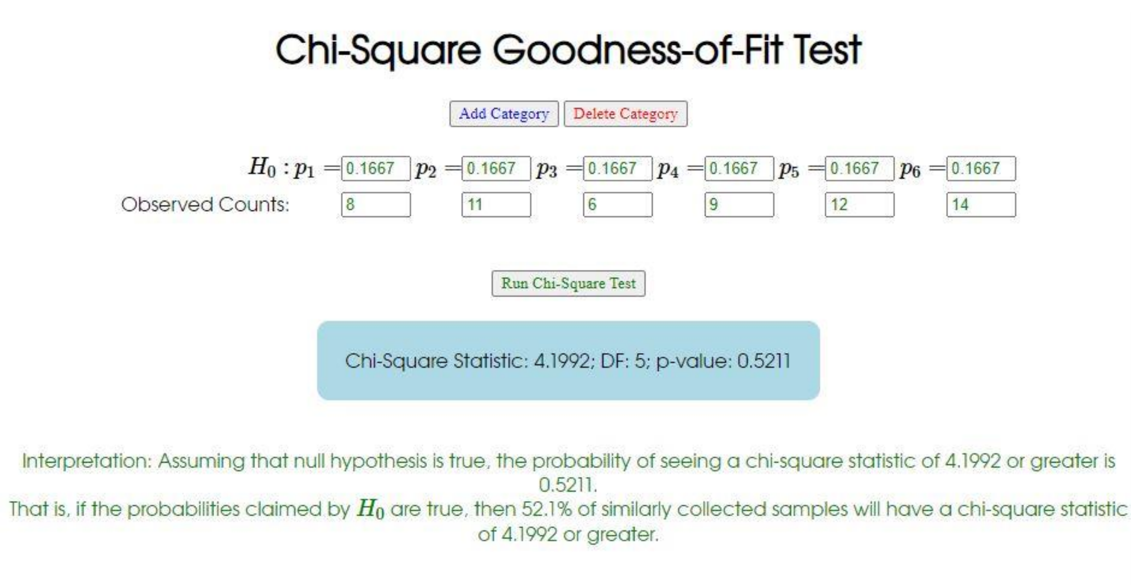
Chi-square tables for $\alpha = 0.05$ and $v = (6-1) = 5$

Critical value on table X^2 0.05,5 = 11.070

4.2 < 11.071 → do not reject H0

there isn't sufficient evidence to conclude that the die is not fair

P=1/6 = 0,1667



Q2: A nut factory produces a nut mix that's supposed to be 50% peanuts, 30% cashews, and 20% almonds. To check that the nut mix proportions are acceptable, we randomly sample 1000 nuts and find the following frequencies:

Nut	Frequency (Oi)	Ei	(Oi - Ei)	$((Oi-Ei))^2$	$(Oi-Ei)^2/Ei$
Peanuts	621	500	121	14641	29.282
Cashew	189	300	-111	12321	41.07
Almonds	190	200	-10	100	0.5

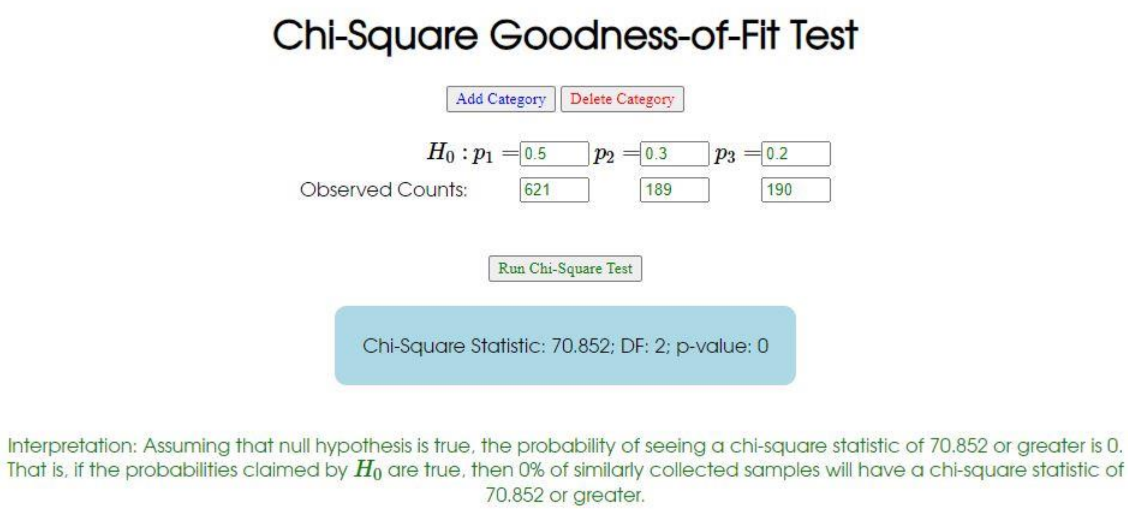
X^2=70.852

Chi-square tables for α = 0.05 and v = (3-1) = 2

Critical value on table : X^2 0.05,2 = 5.991

70.852 > 5.991 → reject the H0

The nut mixture does not contain the required proportions of nuts



Q3: You're hired by a dog food company to help them test three new dog food flavors. You recruit a random sample of 75 dogs and offer each dog a choice between the three flavors by placing bowls in front of them. You expect that the flavors will be equally popular among the dogs, with about 25 dogs choosing each flavor

Flavor	Frequency (Oi)	Ei	(Oi - Ei)	$((Oi-Ei))^2$	$(Oi-Ei)^2/Ei$
With beef	22	25	-3	9	0.36
With chicken	30	25	5	25	1
With fish	23	25	-2	4	0.16

$X^2 = 1.52$

Chi-square tables for $\alpha = 0.05$ and $v = (3-1) = 2$

Critical value on table : $X^2_{0.05,2} = 5.991$

$1.52 < 5.991 \rightarrow$ not reject the H0 ,

There is not enough evidence to conclude that dog food flavors are unevenly popular among dogs.