AP Biology Chi-Squared Practice Problems

(Set 2)

The integration of analytical skills in the AP Biology course has provided a new challenge for AP Biology teachers. In an attempt to facilitate student mastery of unfamiliar skills I have chosen to front-load analytical skills into beginning of my course. My students will be assessed with a minimum of 5 grid-in problems on each unit exam.

I have experienced extreme difficulties finding chi-squared problems that are not all content specific, but still appropriate for the course. In order to implement the course long strategy I needed a bank of problems that students could complete at any time in the course. I've decided to pass these problems I've developed on to the AP Biology teachers who are experiencing the same struggle!

Chi-Squared Formula: $x^2 = \Sigma \frac{(O-E)^2}{E}$ **Where:**

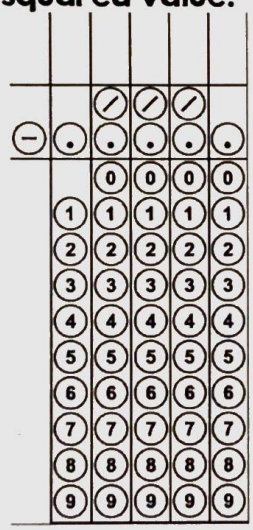
O = Observed Result
E = Expected Result
Σ = Sum of

Critical Values:

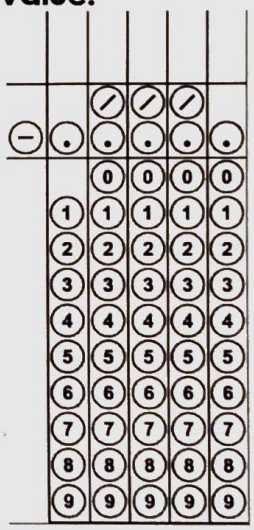
Degrees of Freedom	Level of Probability (P)									
	.98	.95	.80	.50	.20	.10	.05	.02	.01	.001
1	.001	.004	.064	.455	1.64	2.71	3.84	5.41	6.64	10.83
2	.040	.103	.466	1.386	3.22	4.61	5.99	7.82	9.21	13.82
3	.185	.352	1.005	2.366	4.64	6.25	7.82	9.84	11.35	16.27
4	.429	.711	1.649	3.357	5.99	7.78	9.49	11.67	13.28	18.47
5	.752	1.145	2.343	4.351	7.29	9.24	11.07	13.39	15.09	20.52

1. When studying animal behavior, the distribution of organisms within a choice chamber can be studied to identify animal preferences. 100 Isopods are placed in a 4-choice choice chamber. A cotton ball dampened with distilled water is placed in Chamber A; A cotton ball dampened with vinegar is placed in chamber B, a cotton ball dampened with cough medicine is placed in chamber C, and a cotton ball dampened with soda is placed in chamber 10. After 15 minutes 17 isopods are in chamber a; 8 isopods are in the chamber with vinegar, 35 isopods are in the chamber with the cough medicine, and 40 isopods are in the chamber with the soda . Perform the chi-squared test to determine if the distribution of isopods is significant or due to random chance. (3 points)

a. Complete the grid in space with the chi-squared value.



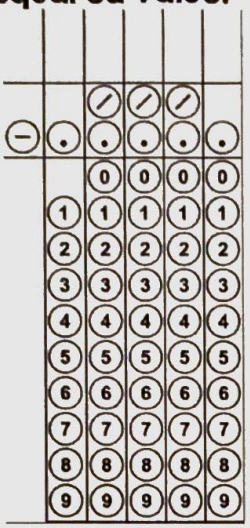
b. Complete the grid in space with the critical value.



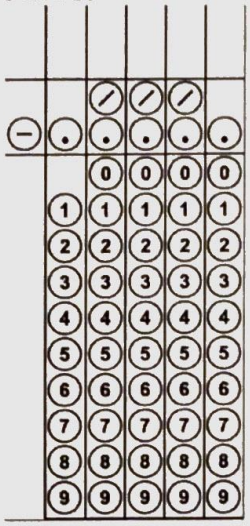
c. Do you reject the null hypothesis?
Yes or No

2. When studying animal behavior, the distribution of organisms within a choice chamber can be studied to identify animal preferences. 8 isopods are placed into a two choice chamber. Chamber A is covered in red paper; chamber B is covered in blue paper. After 15 minutes 6 isopods are in chamber A, 2 isopods are in chamber B. Perform the chi-squared test to determine if the distribution of isopods is significant or due to random chance. (3 points)

a. Complete the grid in space with the chi-squared value.



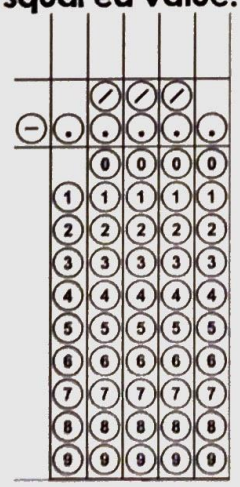
b. Complete the grid in space with the critical value.



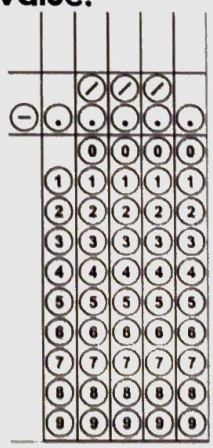
c. Do you reject the null hypothesis?
Yes or No

3. A scientists proposes that mosquitoes prefer individuals with a certain blood type. 33 mosquitoes are allowed to choose to drink from samples of blood with 3 types: A, B, and O. After 2 hours the 15 mosquitoes drank A type blood, 11 mosquitoes drank B type blood, and 7 mosquitoes drank O type blood. Use a chi square analysis to determine if mosquitoes prefer to drink one blood type over another (3 points).

a. Complete the grid in space with the chi-squared value.



b. Complete the grid in space with the critical value.



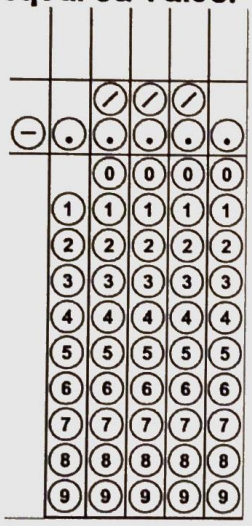
c. Do you reject the null hypothesis?
Yes or No

4. Chase insists that Mondays are the worst, and students are more likely to be tardy on Mondays. In an effort to convince the principal to grant a 10 minute tardy grace period on Wednesdays Chase collects tardy data on 50 students for one week.

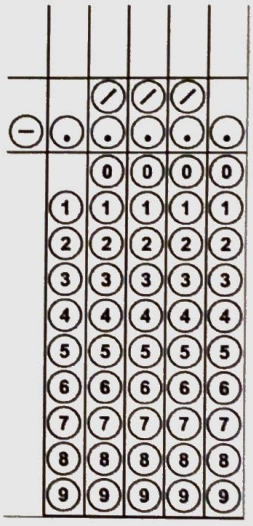
Week Day	Monday	Tuesday	Wednesday	Thursday	Friday
# tardy	12	13	6	12	7

Use a chi square analysis to see if Chase is correct, and if students are significantly more likely to be tardy on Mondays.

a. Complete the grid in space with the chi-squared value.



b. Complete the grid in space with the critical value.

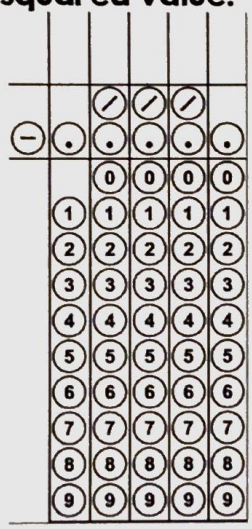


c. Do you reject the null hypothesis?
Yes or No

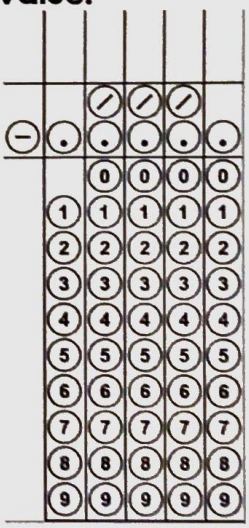
5. An angry group of parents have petitioned for the right to choose the music played at prom. The parents suggest that the type of music played increases the likelihood of inappropriate PDA between teens. An enterprising AP biology class decides to disprove the parents by measuring the instances of public displays of affection that occur during different songs at a small dance. The group studies 24 students. Perform a chi-squared analysis to determine if the music playing effects the numbers of PDA s in a group of teens.

	Hip Hop	Country	Metal	Classics
# PDAs	8	7	3	6

a. Complete the grid in space with the chi-squared value.



b. Complete the grid in space with the critical value.



c. Do you reject the null hypothesis?
Yes or No