

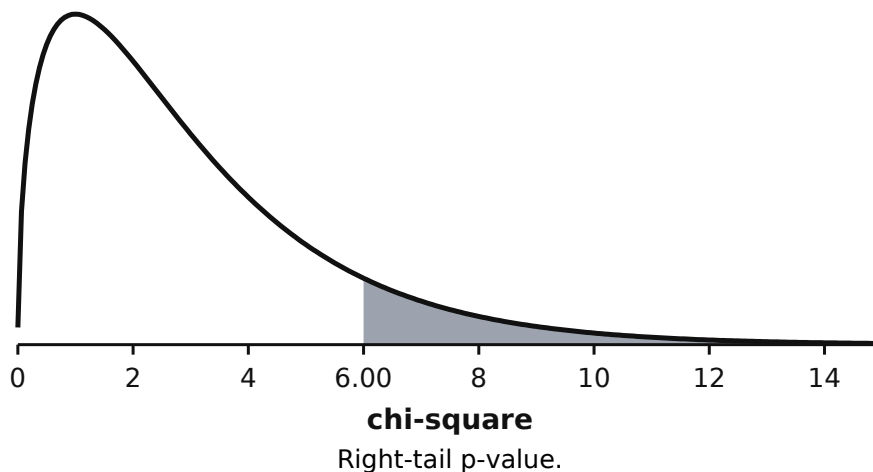
AP Statistics - Chi-Square Tests - Test Answer Key

Common Core AP STAT 8.1, AP STAT 8.2, AP STAT 8.3, AP STAT 8.4, AP STAT 8.5, AP STAT 8.6, AP STAT 8.7 · maths-pdf.fr/en/

Each solution is followed by a scoring guide. Award points for correct hypotheses, expected counts, the chi-square statistic with df, the p-value, and a conclusion linked to the context.

AP Statistics · Common Core State Standards: **AP STAT 8.1, AP STAT 8.2, AP STAT 8.3, AP STAT 8.4, AP STAT 8.5, AP STAT 8.6, AP STAT 8.7**

Question 1 - Goodness-of-fit test [5 pts]



$H_0: p_A = p_B = p_C = p_D = 0.25$. Random sample; expected counts all 20, at least 5.
 $\chi^2 = 6.00$, $df = 3$, p-value = 0.1116.

Fail to reject H_0 : not convincing evidence that the categories are not equally likely.

Scoring: 1 point each for hypotheses, conditions, chi-square and df, p-value, and conclusion in context.

Question 2 - Expected counts [3 pts]

	Yes	No	Total
Group X	22 (28.0)	38 (32.0)	60
Group Y	48 (42.0)	42 (48.0)	90
Total	70	80	150

Observed (expected).

Expected = row total x column total / 150: 28.0, 32.0, 42.0, 48.0. $df = (2-1)(2-1) = 1$.

Expected counts as shown; df = 1.

Scoring: 2 points for expected counts (1 if one error), 1 point for df.

Question 3 - Chi-square statistic [3 pts]

$$\chi^2 = \sum \frac{(O-E)^2}{E} = 4.02, df = 1, p\text{-value} = 0.0450.$$

chi-square = 4.02; p = 0.0450.

Scoring: 1 point for the sum, 1 point for the statistic, 1 point for the p-value.

Question 4 - Which test [2 pts]

(a) One sample, two variables: independence. (b) Two populations, one variable: homogeneity.

(a) independence; (b) homogeneity.

Scoring: 1 point each.

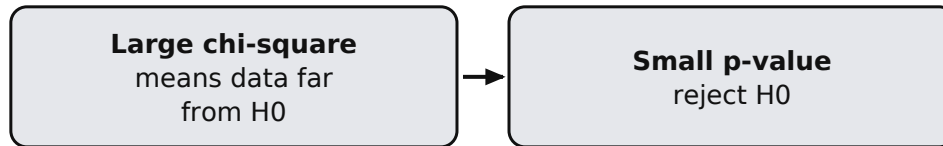
Question 5 - Conditions [2 pts]

The smallest expected count is 4, which is less than 5.

No, because one expected count is below 5.

Scoring: 1 point for the answer, 1 point for the reason.

Question 6 - Interpretation [2 pts]



Interpreting chi-square.

The p-value 0.0074 is less than 0.05.

There is convincing evidence of an association between type of music and age group.

Scoring: 1 point for rejecting H_0 , 1 point for the conclusion in context.

Question 7 - Degrees of freedom [1 pt]

$4-1=3$ and $(4-1)(3-1)=6$.

3 and 6.

Scoring: 1 point for both.

Question 8 - Choose a procedure [2 pts]

(a) One-sample t interval. (b) Two-sample z test (or interval) for the difference of proportions.

(a) one-sample t interval; (b) two-proportion z procedure.

Scoring: 1 point each.

Total
20 points