

Use the following information for # 1 and 2.

The National Survey of Adolescent Health interviewed several thousand teens (grades 7 to 12). One question asked was “What do you think are the chances you will be married in the next ten years?” Here is a two-way table of the responses by sex:

	Female	Male
Almost no chance	119	103
Some chance, but probably not	150	171
A 50-50 chance	447	512
A good chance	735	710
Almost certain	1174	756

_____ 1) The degrees of freedom for the χ^2 test for this two-way table are

- (a) 2. (b) 4. (c) 8. (d) 9. (e) 20.

_____ 2) The null hypothesis for the χ^2 test for this two-way table is

- (a) Equal proportions of female and male teenagers are almost certain they will be married in ten years.
 (b) There is no difference between female and male teenagers in their opinions about their chances of being married in ten years.
 (c) There are equal numbers of female and male teenagers.
 (d) There is a difference between female and male teenagers in their opinions about their chances of being married in ten years.
 (e) There is no association between the number of female teens who responded “almost certain” and the number of male teens who feel this way.

Use the following information with #3 and #4.

A well-known chewing gum maker wants to determine if people who chew gum have a preference of flavors. A random sample of sales is selected. Here are the results:

Flavor	Peppermint	Cinnamon	Wintergreen	Spearmint
Number sold	25	19	22	14

_____ 3) If the null hypothesis is that the proportion of preferences are evenly distributed, then the test statistic and P -value for this χ^2 test are

- (a) $\chi^2 = 3.3$; and $P = 0.348$.
 (b) $\chi^2 = 0$ and $P = 1$.
 (c) $\chi^2 = 5.2$ and $P = 0.158$.
 (d) $\chi^2 = 7.7$ and $P = 0.053$.
 (e) None of the above is correct.

_____ 4) An appropriate interpretation of this inference procedure is

- (a) gum chewers prefer peppermint flavor.
 (b) unfortunately, one or more of the conditions for inference is violated, so we can’t conclude anything from this study.
 (c) the P -value is so large that H_0 can be rejected. There is no gum preference.
 (d) there is insufficient evidence that gum chewers have a preference among these four flavors.
 (e) there is sufficient evidence of a gum preference. An additional inference procedure would need to be done to determine which flavor is preferred.

_____ 5) A survey conducted to determine whether alcohol consumption and smoking are related. The following information has been compiled for 600 subjects.

	Smoker	Non-smoker
Drinker	193	165
Non-drinker	89	153

Assume a significance test will be performed to determine if there is a relationship. Which of the following statements is true?

- a) H_a is smoking and alcohol consumption are independent
- b) H_0 is smoking and alcohol consumption are not independent
- c) The test statistic (χ^2) is 3.84.
- d) The test statistic (χ^2) is 7.86.
- e) At a α level of 0.01, we can conclude that smoking and alcohol consumption are related.

_____ 6) The main difference between a χ^2 test of independence and a χ^2 test for homogeneity of proportions in which of the following?

- a) They are based on a different number of degrees of freedom
- b) One of the tests is for a two-sided alternative and the other is for a one sided alternative
- c) In one case, two variables are compared within a single population. In the other case, two populations are compared in terms of a single variable.
- d) For a given value of χ^2 , they have different P-values.
- e) There is no difference between the tests. They measure exactly the same thing.

Use the following information for #7 and 8

Each person in a random sample of 50 was asked to state his/her gender and preferred color. The resulting counts are shown below.

	Red	Blue	Green
Male	5	14	6
Female	15	6	4

_____ 7) A χ^2 test is used to test the null hypothesis that gender and preferred color are independent. Which of the following statements is NOT true about the expected counts for this situation?

- a) All expected counts are greater than 1.
- b) No more than 20% of all expected counts are less than 5.
- c) The expected counts for the males is the same as the counts for the females.
- d) The expected counts for the males and females are all greater than the observed counts.
- e) All these statements are true.

_____ 8) Which of the following statements is a correct decision about the null hypothesis?

- a) Reject at the $\alpha = .005$ level
- b) Reject at the $\alpha = .01$ level, but not at .005
- c) Reject at the $\alpha = .025$ level, but not at .01
- d) Reject at the $\alpha = .05$ level, but not at .025
- e) Fail to reject at the $\alpha = .05$ level

Part 2: Provide detailed, concise responses. Be sure to include all information and steps to the procedures.

9) A study was performed to examine the personal goals of children in grades 4, 5, and 6. A random sample of students was selected from schools in Georgia. The students received a questionnaire regarding achieving personal goals. They were asked what they would most like to do at school: make good grades, be good at sports, or be popular. Results are presented in the table below by the gender of the child.

	Boys	Girls
Make good grades	96	295
Be popular	32	45
Be good at sports	94	40

Are the distributions of the responses between the boys and girls the same? Carry out a significance test to determine this.

- 10) A recent estimate by a large distributor of gasoline claims that 60% of all cars stopping at their service stations chose unleaded gas and that super unleaded and regular were each selected 20% of the time. In order to check the validity of these proportions, a study was conducted of cars stopping at the distributor's service stations in a large city. The results were as follows:

Gasoline Selected		
Regular	Unleaded	Super Unleaded
51	261	88

Carry out a significance test of the distributor's claim.

- 11) A controversial issue in sports is the use of the “instant replay” for making decisions on plays that are extremely close or hard to call by an official. A random survey of players in each of four professional sports was conducted, asking them if they felt instant replays should be used to decide close or controversial calls. The results are as follows:

	<u>Use of Instant Replay</u>	
	<u>Favor</u>	<u>Oppose</u>
Football	22	2
Baseball	18	6
Basketball	15	26
Soccer	3	10

Perform a complete inference test to see whether opinion with respect to the use of instant replays depends on the sport played.

- 12) The M&M/Mars Company reports that their Peanut Chocolate M&M's have the following color distribution: 20% each of browns, yellows, reds, and blues and 10% each of greens and oranges. In a randomly chosen sample of Peanut M&M's the following distribution occurred:

Brown	Yellow	Red	Blue	Green	Orange
12	7	4	8	13	2

Determine if the colors in the sample are aligned with the population color distribution by performing the appropriate significance test.