Review 11 AP Statistics Name:

1. A grocery store sells four different sizes of a popular brand of corn flakes. For the past few years the proportion of boxes they sell of each size has been quite stable: 10% Small, 15% Medium, 60% Large, and 15% Jumbo. They decide to change the pricing of the four sizes and want to see if this changes the proportion of boxes they sell of each size. To test this, a few weeks after changing the prices they take a simple random sample of 120 transactions involving corn flakes and count how many boxes of each size were sold. Here are the results.

Observed number of boxes sold for each box size

Small	Medium	Large	Jumbo
8	24	61	27

(a) We wish to carry out a test of significance to see if the distribution of sizes of cereal boxes sold has changed. State the null and alternative hypotheses for this test.

(b) Find the expected counts for each size box under the assumption that the null hypothesis is true.

Expected number of boxes sold for each box size

Small	Medium	Large	Jumbo

(c) Discuss whether the conditions for this test have been met.

(d) Find the value of the test statistic and the *P*-value of the test, and make the appropriate conclusion. Use $\alpha = 0.05$.

(e) Based on your answer to (d), which error is it possible that you have made, Type I or Type II? Describe that error in the context of the problem.

(f) Use the components of the chi-square statistic to perform a follow-up analysis on the impact of the new prices on the sales of different sizes of cereal boxes.

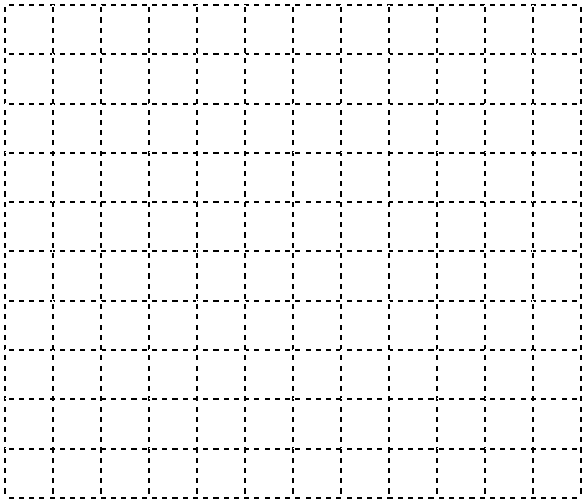
2. A radio station trying to determine what kind of music to play takes a simple random sample of 50 students at each of three locations: a local middle school, a high school, and a college. The students are asked to choose which of three different music genres they most enjoy hearing on the radio. Here are the results:

		Music Genre			
		Hip Hop	Alternative	Post-rock	Total
Age level	Middle School	28	18	4	50
	High School	22	22	6	50
	College	16	20	14	50
	Total	66	60	24	150

(a) In the table below, provide the appropriate conditional distributions based on the data collected for comparing the music-listening preferences of the three age levels, based on the data above.

		Music Genre		
		Hip Hop	Alternative	Post-rock
Age level	Middle School			
	High School			
	College			

(b) Make a graph that illustrates these conditional distributions effectively, and use the table from (a) and your graph to describe the relationship between age level and preferred music genre.



(c) Perform the appropriate statistical test to determine if there is a difference in the music preference of these three age groups.

(d) If you chose a chi-square test for homogeneity in part (c), explain how the data could have been obtained to make a chi-square test for independence appropriate. If you chose a test for independence, explain how the data could have been obtained to make a test for homogeneity appropriate.