

# **Math Virtual Learning**

# AP stats / Chi squared test of independence/association May 18, 2020



#### Lesson: May 18, 2020

#### Objective/Learning Target: Students will be introduced to the setting for Chi squared goodness of fit tests

# Review #1

The number of hybrid cars a dealer sells weekly has the following probability distribution.

Number of cars	0	1	2	3	4	5
probability	0.32	0.28	0.15	0.11	0.08	0.06

The dealer purchases the cars for \$21,000 and self them for \$24,500. What is the expected weekly profit from selling hybrid cars?

# Review #2

Which of the following are true statements about the chi-square distribution?

- 1. For small df, the distribution is skewed to the right. However, for large df, it becomes more symmetric and bell shaped.
- 2. For 1 or 2 degrees of freedom, the histogram peak occurs at 0. For 3 or more degrees of freedom, the peak is at df-2
- 3. There is a separate chi-square curve for each df value.

#### Answers

1. 0(0.32) + 1(0.28) + 2(0.25) + 3(0.11) + 4(0.08) + 5(0.06) = 1.53 cars per week. The profit per car is \$3,500. So weekly profit is 1.53(3,500) = \$5,355

2. All three are true. Like the t-distribution, there is a seperate curve for each df value, and for large df the distribution is more symmetric and bell shaped.

# Testing independence of categorical variables

Least Squares Regression allows us to test if two quantitative variables are independent or if there is an association between them. We can also check to see if categorical variables have an association. For example, if we want to see if political beliefs change based on education, we could survey people on their level of education and their political beliefs. The Chi-square test can tell us if the difference in political belief for each level of education is significantly different enough to be more than chance. However, it will not give us information on how it is different. More advanced techniques are needed to define the association. The following video outlines the chi squared test of independence.

Chi squared test of independence



Free Response problem

Answer