AP Stats 11.1

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1.

a) H_0 : The companies claimed distribution for its mixed nuts is correct. H_a : The companies claimed distribution is incorrect.
b) 78 cashews, 40.5 almonds, 19.5 macadamia nuts, 12 brazil nuts
c)

$$\begin{aligned} x^2 &= \sum \frac{(\text{observed} - \text{expected})^2}{\text{expected}} \\ &= \frac{(83-78)^2}{78} + \frac{(29-40.5)^2}{40.5} + \frac{(20-19.5)^2}{19.5} + \frac{(18-12)^2}{12} \\ &\approx 6.599 \end{aligned}$$

7.

It would not be appropriate to perform a chi-square test for these data because time spent doing the homework is not a piece of categorical data.

9.

STATE: H_0 : the distribution of colors in the Kellogg's Froot Loops cereal is equal. H_a : the distribution is not equal.
PLAN: chi-square test for goodness of fit
Random: selection is random
10%: $n = 120 < 10\%$ of all Froot Loops
Large Counts: All expected counts are $\frac{120}{6} = 20$, which is greater than 5

DO:

$$\begin{aligned} x^2 &= \sum \frac{(\text{observed} - \text{expected})^2}{\text{expected}} \\ &= 7.9 \\ df &= 6 - 1 = 5 \\ \text{P-value} &= 0.1618 \end{aligned}$$

CONCLUDE: Because the P-value (0.1618) is greater than the significance level (0.05), we can't reject H_0 and thus the data does not provide convincing evidence that the distribution of the colors of Froot Loops is not equal.

15.

a) H_0 : The probability distribution of skittle flavors is equal, with 20% each.
H_a : The distribution is not equal.
b) 12 each
c) 11.07 for 0.05, and 15.08 for 0.01