

1.
 - a. Skewed right
 - b. χ^2 values are always positive because the differences in observed and expected values are squared in the test statistic calculation. The test statistic measures only the size of the deviation from the expected distribution, not the direction.
 - c. The χ^2 distribution has a minimum value of 0 but no maximum value. The greater the χ^2 value, the further the observed values are from the expected values, and the smaller the probability of seeing such a result. This results in a tail on the right side.

2. a.

	Beach Vacation	Mountain Vacation	City Vacation	Total
18 – 34	58	25	13	96
35 and older	34	57	21	112
Total	92	82	34	208

- b. $\frac{92}{208} \approx 0.442$
 - c. proportion of 0.442 for each age group
 - d. $0.442(96) \approx 42.43$ adults aged 18-34
 - e. $0.442(112) \approx 49.50$ adults aged 35 and older
 - f. $\frac{34}{208} \approx 0.163$
 - g. 18.26 adults aged 35 and older
3.
 - a. The response variable is categorical and there are more than 2 categories. Two independent groups are selected (1,453 teens and 1,453 parents), but only one variable is being recorded (perception of screen time use).
 - b. “Too Little” because we expect the proportion of responses falling into each category to be the same for teens and parents, and in this category, the proportions are the same $\left(\frac{73}{1453}\right)$. There is no difference between the expected counts and observed counts.
 - c.

$$\chi^2 = \frac{(595 - 646)^2}{\frac{646}{734}} + \frac{(697 - 646)^2}{\frac{646}{73}} + \frac{(785 - 734)^2}{\frac{734}{73}} + \frac{(683 - 734)^2}{\frac{734}{73}} + \frac{(73 - 73)^2}{\frac{73}{73}} + \frac{(73 - 73)^2}{\frac{73}{73}}$$

$$\approx 4.026 + 4.026 + 3.544 + 3.544 + 0 + 0 \approx 15.140$$

$$df = 2$$
 - d. p -value = 0.000516; Yes, since $0.000516 < 0.05$, there is convincing statistical evidence that there is a difference in the distribution of screen time use between teens and parents.

4. a. H_0 : The distribution of online orders (pick-up vs. delivery) is the same for both pizza shops.
 H_a : The distribution of online orders (pick-up vs. delivery) is not the same for both pizza shops.
- b. A two-sample z -test for $p_C - p_S$
 $H_0 : p_C - p_S = 0$
 $H_a : p_C - p_S \neq 0$
where $p_C - p_S$ is the true difference in the proportions of all online orders that are pick-up orders between the two pizza shops (Crispy Crust - Slice Haven).
(Note:
“proportions of all online orders that are delivery orders” is also correct).

5. A

6. B