

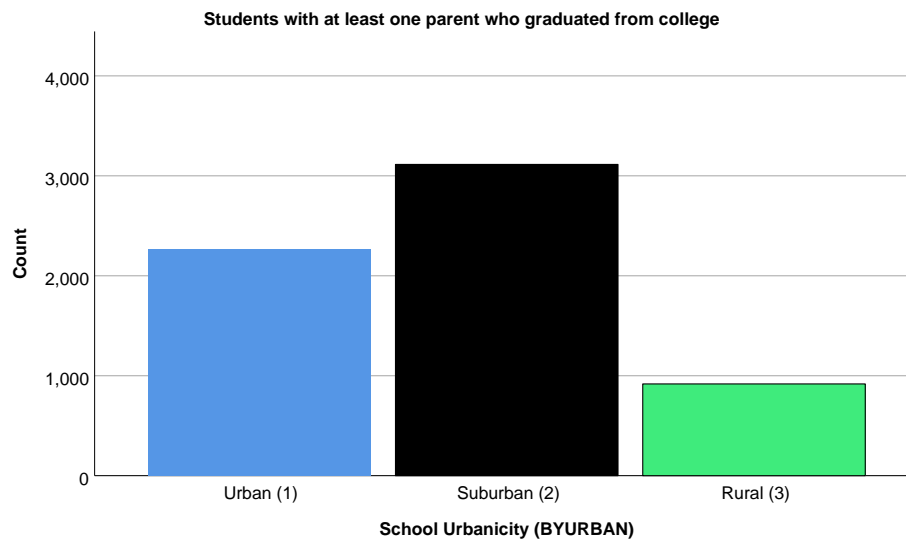
Percentages, Bar Charts, and Pie Charts

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- We are in section 2.1 of the textbook
- *Bar graphs* display qualitative data, one bar for each category. The length of each bar is the count (frequency) or percentage in the category.
- *Pie charts* display qualitative data, one slice for each category. The size of each slice is proportional to the percentage in the category.
- The count (frequency) in a category can be converted to a *percent* (proportion, relative frequency) by dividing the count by the total number of individuals.
 - Percentages help compare data sets with different total numbers of individuals.

1. ELS:2002 features a nationally representative, longitudinal study of 10th graders in 2002 and 12th graders in 2004. The study consisted of surveys of students, their parents, math and English teachers, and school administrators. Data was collected in 2002 (base year), 2004 (first follow-up), 2006 (second follow-up), 2012 (third follow-up).
 - (a) Is this an experimental or an observational study. Explain your answer in two to three sentences.
 - (b) What is the implied population in this study?
 - (c) What type of sampling was used in this study - simple random, systematic, cluster, or stratified? Explain your answer in two to three sentences.
 - (d) Throughout the semester, we'll be studying several variables from this data set. A few are listed below. For each variables determine the level of measurement.
 - i. BYURBAN - school urbanicity (urban, suburban, rural)

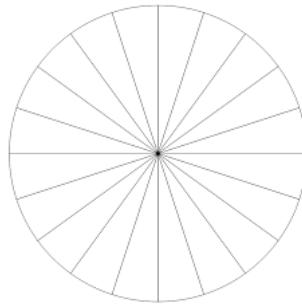
- ii. BYPARED - parents' highest level of education (Did not finish high school, Graduated from high school or GED, Attended 2-year school no degree, Graduated from 2-year school, Attended college no 4-year degree Graduated from college, Completed Master's degree or equivalent, Completed PhD, MD, other advanced degree)
 - iii. BYA24A - percent of full-time teachers who are certified (0% to 100%)
 - iv. BYTXCSTD - standardized test composite score-math/reading (20.91 to 81.04)
2. The following bar chart shows the number of students from the ELS:2002 study with at least one parent who graduated from college. The data is split into three categories referring to high school urbanicity: urban, suburban, and rural.



Graduated from college is BYPARED category Graduated from college, Completed Master's degree or equivalent, or Completed PhD, MD, other advanced degree.

- (a) What was the total number of students with at least one parent who graduated from college in the study?

- (b) What percent of students with at least one parent who graduated from college attended an urban high school?
- (c) What percent of students with at least one parent who graduated from college attended a suburban high school?
- (d) What percent of students with at least one parent who graduated from college attended a rural high school?
- (e) Make a pie chart that shows the same data as the bar chart.



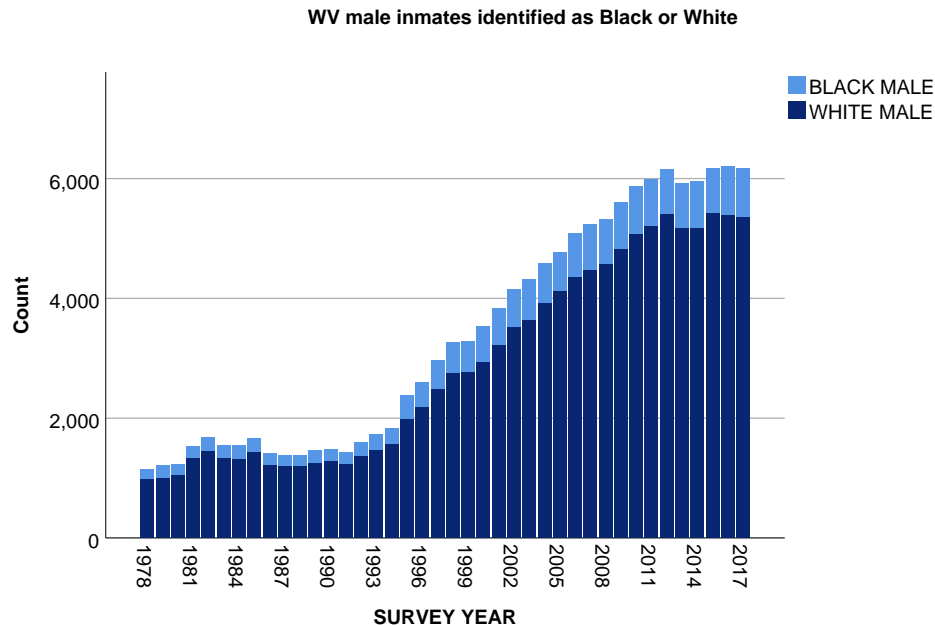
3. If the price of an item changes from \$70 to \$90, what is the percent change?

$$\text{Percent change} = \frac{\text{Amount of change}}{\text{Original amount}}$$

4. If the price of an item changes from \$70 to \$60, what is the percent change?

5. The National Prisoner Statistics, United States, 1978 - 2017 study provides an enumeration of persons in state and federal prisons and collects data on key characteristics of the nation's prison population.

The following graphic shows the total number of inmates in WV who were identified as black (not of Hispanic origin) or white (not of Hispanic origin)¹.



- (a) How many inmates in WV were identified as black (not of Hispanic origin) in 2010?
- (b) How many inmates in WV were identified as white (not of Hispanic origin) in 2002?
- (c) In 1992, what percent of the overall data were inmates in WV identified as black?
- (d) What was the percent change in total inmates in WV from 1978 to 2017?

¹WV does have male inmates identified into other demographic groups. Black and white are the two largest racial demographic groups. In 2017, there were 109 additional inmates identified as 41 Hispanic, 7 American Indian or Alaskan Native, 7 Asian, 2 native Hawaiian or Pacific Islander, and 52 two or more races (not of Hispanic origin).