

SOLUTIONS

- For each of the following topics, indicate whether the variable or variables used to measure it are continuous or categorical, and single or multiple response.
 - Categorical, single-response.
 - Continuous, single-response.
 - Continuous, multiple-response.
 - Categorical, multiple-response.
 - Continuous, single-response.
 - Categorical, multiple-response.
- “Squeaky the mouse solved the maze in an average of 10.4 seconds over nine trials.”
- All measurements must be converted into consistent units (scale and system of measurement). I chose to convert all measurements to kilograms, using the conversion factor 2.2 pounds/kilogram (see revised table 4A). “Of the four specimens compared here, specimen 3 is the heaviest (0.70 kilograms [kg.]). It is about twice as heavy as the lightest (specimen 4, which weighed 0.34 kg.). The other two specimens were about 70% as heavy as specimen 3.”

Table 4A. Mass of four specimens

Specimen	Weight (original units)	Weight (kg.)
1	1.2 lbs.	0.54
2	500 grams	0.50
3	0.7 kilograms	0.70
4	12 ounces	0.34

- Identify pertinent standards or cutoffs for each of the following questions.
 - Speed limit where he was driving and his actual speed.
 - The weight-bearing capacity of the alloy (in weight per unit area) and the expected weight load (again, in weight per unit area) in the library.
 - Her current height and a growth chart (height for age) for girls.
 - Leah’s height and the minimum height requirement for the Ferris wheel.
 - The rate of inflation, current tuition, and rates of tuition increase at Public U over the past few years.
 - Today’s ozone measurement and the cutoff for an ozone warning.

4

FIVE MORE TECHNICAL PRINCIPLES

9. Regarding the questions about HIV-positive Americans:
- Taken together, the two statements imply that 1 in 125,000 Americans are HIV positive and know it, clearly a misstatement of the facts.
 - Rewrite the second statement to clarify the intended meaning.
 - “Half of HIV-positive Americans know they are infected.”
 - “1 in 500 Americans is HIV positive and knows it.”
11. Critique the commuting questionnaire question.
- First, the responses are not mutually exclusive. For example, “car” and “carpool” overlap, as do “public transportation” and “train.” Second, the responses aren’t exhaustive, excluding bus and bicycle, among other possibilities, and omitting an “other (specify)” response. Third, they don’t provide a way for people to record more than one mode of transportation. Fourth, there is no appropriate response for people who don’t work or for those who work at home. And finally, there are no instructions given about how many responses are allowed.
 - “How do you commute to work? (Mark all that apply.)”

Car	—
Train	—
Bus	—
Bicycle	—
Walk	—
Other (specify)	_____
I work at home	—
I do not work	—”
13. Identify the errors and rewrite.
- Proportion and percentage are not consistent units. Write “The proportionate increase in income during the 1990s was 0.20,” or “Income increased by 20% during the 1990s.”
 - The reported sex ratio indicates a lower number in the numerator than the denominator. Either write “Male infants outnumbered females (sex ratio at birth = 1.05 males per female)” (flipping over the ratio to be consistent with the wording, and reporting units as males per female), or “There were slightly fewer male than female infants (sex ratio at birth = 0.95 males per female)” (revising the wording to be consistent with the numeric value, and reporting units as males per female).
 - The value 0.67 does not indicate a majority unless labeled as a proportion. Better to express the value as a percentage. Write “A majority of respondents (67%) agreed that there should be a waiting period before buying a gun.”
 - A death rate is expressed relative to the population (e.g., number of living people), not as a percentage of deaths (e.g., relative to the total

number of deaths). Unless the total population and number of deaths are known, the first half of the sentence doesn't include enough information to calculate the death rate. Write "Cancer accounted for two out of every ten deaths."

15. Table 4C should be completed to indicate whether the following values make sense for the concepts and units mentioned, and if not, to indicate a plausible range of values for that variable.

Table 4c

Concept	Units	Value	Plausible (Y/N?)	If no, specify a plausible range of values
a. Height of an adult female in the US, 2014	Inches	65	Yes	
b. Height of an adult female in the US, 2014	Inches	120	No, 10' is much too tall	58" to 78"
c. Height of a 6-year-old child in the US, 2014	Inches	65	No, too high to be biologically plausible	40" to 47"
d. Height of a 6-year-old child in the US, 2014	Centimeters	120	Yes	
e. Observed daily low temperature, New York City, January	Degrees Fahrenheit	30	Yes	
f. Observed daily low temperature, New York City, January	Degrees Fahrenheit	-10	Yes	
g. Observed daily low temperature, New York City, January	Degrees Celsius	30	No, 30°C corresponds to 86°F, which is too high for NYC in January	
h. Observed daily low temperature, New York City, January	Degrees Kelvin	-10	No, 0 is the lowest possible value for temperature on the Kelvin scale	250 to 280 K
i. Mean hourly wage, fast food employee, Los Angeles, CA, 2010	Dollars	8	Yes	
j. Mean annual wage, fast food employee, Los Angeles, CA, 2010	Dollars	8	No, much too low for annual wages in the specified time, place, and units	\$2,000 (part-time summer) to \$15,000 (full-time year round)

(continued)

Table 4c (continued)

Concept	Units	Value	Plausible (Y/N?)	If no, specify a plausible range of values
k. Share of population that is poor	Percentage	25	Yes	
l. Share of population that is poor	Percentage	-5	No, a percentage share cannot be negative	0% to 100% are the upper and lower definitional limits for a percentage share
m. Share of population that is poor	Proportion	25	No, a proportion cannot exceed 1.0	0.0 to 1.0 are the upper and lower definitional limits for a proportion
n. Share of population that is poor	Proportion	0.05	Yes	
o. Change in share of population that is poor	Percentage change	0.05	Yes	
p. Change in share of population that is poor	Percentage change	-5	Yes	

17. Answers to questions about construction of an abortion attitude scale using the items shown in table 4D.

- a. The “don’t know” answers should be treated as missing values, meaning that the numeric code of 8 will not be treated numerically in the computation of the scale.
- b. If the scores on the individual items are *summed* to compute the scale,
 - i. the minimum valid value = 6 and the maximum = 12.
 - ii. a scale score of 12 for an individual respondent would mean that that person said “no” to all six items.
- c. If the scores on the individual items are *averaged* to compute the scale, the minimum valid value of the scale = 1 and the maximum = 2.
- d. If the scale consists of a *tally* of the number of items with which a respondent agreed, the minimum valid value of the scale = 0 (didn’t agree with any items), and the maximum = 6 (agreed with all items).
- e. If only valid (“yes” or “no”) answers to each abortion question were included in the calculation of the scale, any respondent who said “don’t know” to one or more of the items would be excluded from the final analytic sample because missing values on any item excludes them from the calculation.