

AP Statistics Chapter 4 – Practice Multiple-Choice Questions

- Which of these statements is consistent with the function $y = 53.6(1.037)^x$?
 - This function follows the form of exponential growth
 - The y-intercept of this function is 53.6
 - The growth rate for this function is 103.7%
 - I only
 - II only
 - III only
 - I and II only
 - II and II only
- For a nonlinear set of data, a transformation is made using $\log x$ and $\log y$. This linearizes the data and a regression equation of $y = 1.489 + 2.171x$ is found. What is the appropriate nonlinear function to be made from this linear equation?
 - $y = 30.832(148.252)^x$
 - $y = 30.832(2.171)^x$
 - $y = 30.832x^{2.171}$
 - $y = 30.832x^{148.252}$
 - None of the above
- A researcher observes that, on average, the number of divorces in cities with major league baseball teams is larger than in cities without major league baseball teams. The most plausible explanation for this observed association is that
 - the presence of a major league baseball team causes the number of divorces to rise (perhaps husbands are spending too much time at the ballpark).
 - the high number of divorces is responsible for the presence of a major league baseball team (more single men means potentially more fans at the ballpark, making it attractive for an owner to relocate to such cities).
 - the association is due to common response (major league teams tend to be in large cities with more people and thus with a greater number of divorces).
 - the observed association is purely coincidental. It is implausible to believe the observed association could be anything other than accidental.
 - the presence of a major league baseball team in a city will increase the mean income (some wives would expect that their husbands would have more money to spend on them).

4. A researcher computed the average SAT math score of all high school seniors who took the SAT exam for each of the 50 states. The researcher also computed the average salary of high school teachers in each of these states and plotted these average salaries against the average SAT math scores for each state. The plot showed a distinct negative association between average SAT math scores and teacher salaries. The researcher may legitimately conclude which of the following?
- A) Increasing the average salary of teachers will cause the average of SAT math scores to decrease, but it is not correct to conclude that increasing the salaries of individual teachers causes the SAT math scores of individual students to increase.
 - B) States that pay teachers high salaries tend to do a poor job of teaching mathematics, on average.
 - C) As the pay for an individual teacher increases, the teacher's students are more likely to do poorly on the SAT math.
 - D) The data used by the researcher do not provide evidence that increasing the salaries of teachers will cause the performance of students on the SAT math to get worse.
 - E) States in which students tend to perform poorly in mathematics probably have a higher proportion of problem students and thus need to pay teachers higher salaries in order to attract them to teach in those states.
5. When possible, the best way to establish that an observed association is the result of a cause-and-effect relation is by means of
- A) the least-squares regression line.
 - B) the correlation coefficient.
 - C) randomization to select the data variables.
 - D) a well-designed experiment.
 - E) examining z-scores rather than the original variables.

A business has two types of employees, managers and workers. Managers earn either \$100,000 or \$200,000 per year. Workers earn either \$10,000 or \$20,000 per year. The number of male and female managers at each salary level and the number of male and female workers at each salary level are given in the tables below.

	<u>Managers</u>			<u>Workers</u>	
	Male	Female		Male	Female
\$100,000	80	20	\$10,000	30	20
\$200,000	20	30	\$20,000	20	80

- The proportion of female managers who make \$200,000 per year is
 - 0.067.
 - 0.133.
 - 0.200.
 - 0.400.
 - 0.600.
- The proportion of workers making \$10,000 that are male is
 - 0.100.
 - 0.200.
 - 0.300.
 - 0.400.
 - 0.600.
- In a study of the relationship between the amount of violence a person watches on TV and the viewer's age, 81 regular TV watchers were randomly selected and classified according to their age group and whether they were a "low-violence" or "high-violence" viewer. Here is a two-way table of the results.

		<u>Age Group</u>			<u>Total</u>
		<u>16-34</u>	<u>35-54</u>	<u>55 and over</u>	
<u>Amount of Violence Watched</u>	<u>Low</u>	8	12	21	41
	<u>High</u>	18	15	7	40
<u>Total</u>		26	27	28	81

Which is a correct interpretation of this data?

- There is no association between age and violence watched on TV
- The older people get, the more violence they watch on TV
- The older people get, the less violence they watch on TV
- People aged 35-54 like violent TV programs
- There are more high violence programs than low violence programs on TV

Answers and explanations

1. D

III is not correct because the growth rate is 3.7% (take $1.037 - 1 = .037 = 3.7\%$)

2. C

Taking $\log x$ and $\log y$ means we are using a *power* model. The power model is of the form $y = Ax^B$, where $A = 10^a$ and $B = b$ from the linear equation $y = a + bx$ for $(\log x, \log y)$. So here, we have $A = 10^{1.489} = 30.832$ and $B = 2.171$, so the model is $y = 30.832x^{2.171}$.

3. C

Population size is the common response lurking variable which contributes to both of these variables. Large cities have baseball teams and large cities have a lot of divorces.

4. D

Remember, *association does not mean causation*. Just because there is an *association* or *correlation* between two variables x and y , does not mean that x *causes* y . Further study (a well-designed experiment) would be necessary to establish a cause and effect relationship.

5. D

See the last sentence in #4 above.

6. E

There are 50 female managers of which 30 make \$200,000. So the proportion is $\frac{30}{50} = .6$

7. E

There are 50 workers who make \$10,000 of which 30 are male. So the proportion is $\frac{30}{50} = .6$

8. C

If you look at the percentages that watch high violence programs on TV in each age group you get

16-34	35-54	55 and over
$\frac{18}{26} = 69.2\%$	$\frac{15}{27} = 55.6\%$	$\frac{7}{28} = 25\%$

The decreasing (or negative) trend allows us to make a clear association that as people get older, they are watching less violent programming on television.