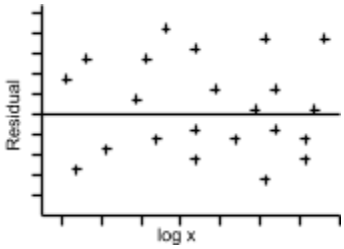
Final/AP Exam - **Review Game 3**

Round 1 - DO NOT WRITE ON THIS PAPER.

1) A pair of measures *x* and *y* were taken on 20 experimental units. A regression analysis is performed on the values of log *y* versus log *x*, resulting in a least-squares regression line. The residual plot for the regression is below.



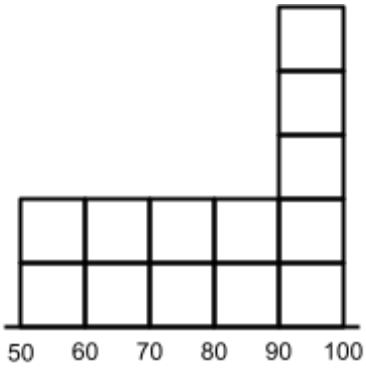
Which of the following conclusions is best supported by the residual plot?

a) *x* has a linear relationship by log *x.*
b) Log *y* has a linear relationship with *x.*
c) Log *y* has a linear relationship with log *x*.
d) *y* has a linear relationship with *x*.
e) The correlation between *y* and *x* is approximately 0.

2) The following is a histogram of test scores.

Which of the following are true statements?

I The median score was 75.
II If 90 and above was an A, most students received an A.
III More students scored below 70 than above 90.



a) I only b) II only
c) III only d) All are true.
e) None are true.

3) Consider the following three events:

I Although 75 percent of Cubs fans believe they will go to the World Series this year, in a random sample of 50 Cubs fans, only 30 “believe.”
II In a survey about literacy, an embarrassed adult deliberately lies.
III A surveyor mistakenly records answers to one question in the wrong space.

Which of the following correctly characterizes the above?

a) I, sampling error; II, response bias; III, human mistake
b) I, sampling error; II, nonresponse bias; III, hidden error
c) I, hidden bias; II, voluntary sample bias; III, sampling error
d) I, undercoverage error; II, voluntary error; III, unintentional error
e) I, small sample error; II, deliberate error; III, mistaken error

4) Box *A* has four $10 bills and a single $100 bill, box *B* has 400 $10 bills and 100 $100 bills, and box *C* has 28 $1 bills. YOu can have all of box *C* or blindly pick one bill out of either box *A* or box *B*. Which choice offers the greatest expected winning?

a) Box *A*
b) Box *B*
c) Box *C*
d) Either *A* or *B*, but not *C*
e) All offer the same expected winning.

5) Consider a hypothesis test with H_0:μ = 58 and H_a: μ >58. Which of the following choices of significance level and sample size results in the greatest power of the test with μ = 60?

a) α = 0.05, n = 20
b) α = 0.01, n = 20
c) α = 0.05, n = 25
d) α = 0.01, n = 25
e) There is no way of answering without knowing the strength of the given power.

6) A study is conducted relating AP Statistics exam score to the total number of study hours for the AP Statistics class put in by students during the academic year, and the correlation is found to be .6. Which of the following are true statements?

I On the average, a 40 percent increase in study time results in a 24 percent increase in exam score.
II Sixty percent of a student's exam score can be explained by the number of study hours.
III Higher exam scores tend to be associated with higher numbers of study hours.

a) I and II
b) I and III
c) II and III
d) I, II, and III
e) None of the above gives the complete set of true responses.

Round 2 - DO NOT WRITE ON THIS PAPER.

7) A botanist is running an experiment on two fertilizers that require different amounts of watering. She has 40 test plots, half of which are in sunny locations, and half are in the shade. She randomly selects 10 sunny plots and 10 shady plots for which to use one fertilizer with its appropriate watering, while the remaining plots are for the other fertilizer with is appropriate watering. Of the following, which is the most important observation about this procedure?

a) The variables, fertilizer and water, are confounded.
b) The variables fertilizer and sun, are confounded.
c) The variables, water and sun, are confounded.
d) No variables are confounded.
e) There is a hidden lurking variable.

8) Which of the following statements are true?

I Like the normal, *t*-distributions are always symmetric.
II Like the normal, *t*-distributions are always mound-shaped.
III The *t*-distributions have less spread than the normal; that is, they have less probability in the tails and more in the center than the normal.

a) II only
b) I and II
c) I and III
d) II and III
e) I, II, and III

9) The yearly average rainfall along the coast of Liberia is 210 inches. What is the standard deviation if 20 percent of the years have rainfalls under 200 inches? Assume yearly rainfalls are normally distributed.

a) 2.00 inches
b) 5.94 inches
c) 11.88 inches
d) 19.07 inches
e) The standard deviation cannot be computed from the information given.

10) A police department public relations spokesperson claims that the mean response time to a 911 call is 9 minutes. A newspaper reporter suspects that the response time is actually longer and runs a test by examining the records of a random sample of 64 such calls. What conclusion is reached if the sample mean is 9.55 minutes with a standard deviation of 3.00 minutes?

a) The *P*-value is less than .001, indicating very strong evidence against the 9-minute claim.
b) The *P*-value is .01, indicating strong evidence against the 9-minute claim.
c) The *P*-value is .07, indicating some evidence against the 9-minute claim.
d) The *P*-value is .18, indicating very little evidence against the 9-minute claim.
e) The *P*-value is .43, indicating no evidence against the 9-minute claim.

11) Which of the following is the proper use of a chi-square test of independence?

a) To test whether the distribution of counts on a categorical variable matches a claimed distribution.
b) To test whether the distribution of counts on a numerical variable matches a claimed distribution.
c) To test whether the distribution of two different groups on the same categorical variable matches.
d) To test whether two categorical variables on the same subjects are related.
e) To test whether two numerical variables on the same subjects are related.

12) A consumer product agency tests kilowatts per hour for a sample of refrigerators, each one of three different sizes. Which of the following is true?

a) There are three explanatory variables and one response variable.
b) There is one explanatory variable with three levels of response.
c) Kilowatts per hour is the only explanatory variable, but there are three response variables corresponding to the different sizes.
d) There are three levels of a single explanatory variable.
e) Each explanatory level has an associated level of response.

Round 3 - DO NOT WRITE ON THIS PAPER.

13) Researchers wish to determine if the stimulant, caffeine, enhances athletic performance. Ten short distance runners are timed in the 100-yard dash on two successive days. Each day they are given either 300

mg of caffeine or a placebo. For each runner, a coin toss determines which identical looking pill is taken which day. Their times (in seconds) are as follows:

Runner	1	2	3	4	5	6	7	8	9	10
Placebo	10.2	9.8	9.9	10.4	10.2	9.8	10.1	10.7	9.7	9.8
Caffeine	10.2	9.6	9.8	10.1	9.8	10.0	10.2	10.4	9.6	9.8

a) Do the data suggest that short distance runners improve their times when using caffeine? Perform an appropriate statistical test.

b) Does knowing a runner's time without drugs help predict his time using caffeine? Perform an appropriate statistical test.

ANSWERS

1) C
2) E
3) A
4) E
5) C

6) E

7) A
8) B
9) C
10) C
11) D
12) D

13)

a) **Name (.5):** Matched Pairs *t*-test
Conditions (.5): Differences are appox. normal, random
Null and Alt Hypotheses (.5): H_0:$\mu_D = 0$ and H_a:$\mu_D > 0$
Values (.5): $t = 1.819$, $df = 9$
***P*-value and compare to alpha (.5):** *p*-value = .0511 fail to reject H_0 at 5%
Conclusion (.5): There is not enough sig data to say caffeine makes a difference.

b) **Name (.5):** Test for regression
Conditions (.5): Scatter plot is approx linear, residuals are random and approx normal
Null and Alt Hypotheses (.5): H_0:$\beta = 0$, H_a:$\beta \neq 0$
Values (.5): $t = 3.82$, $df = 8$
***P*-value and compare to alpha (.5):** $P = .0051$ reject H_0 at a 5% level of significance
Conclusion (.5): There is enough significant data to say that knowing a runner's time without drugs does help predict his time using caffeine.