Name _____ Date _____

AP Statistics Period _____

Transformations in Regression - HW

1) The relationship between A and $\sqrt{B}$ shows a strong negative linear correlation. Which of the following is true?

A. The residual plot of the variables A and B will show a random pattern, and the scatterplot of the variables A and B will show a linear pattern.

B. The residual plot of the variables A and B will show a nonrandom pattern, and the scatterplot of the variables A and B will show a linear pattern.

C. The residual plot of the variables A and B will show a random pattern, and the scatterplot of the variables A and B will show a nonlinear pattern.

D. The residual plot of the variables A and B will show a nonrandom pattern, and the scatterplot of the variables A and B will show a nonlinear pattern.

E. Residual plots cannot be used with quadratic relationships.

2) A scatterplot of a company's revenues versus time indicates a possible exponential relationship. A linear regression on Y = log(revenue in \$1000) against X = years since 2000 gives $\hat{y} = 0.67 + 0.82x$ with $r = .73$. Which of the following are valid conclusions?

I. On the average, revenue goes up 0.82 thousand dollars (or \$820) per year.
II. The predicted revenue in year 2005 is approximately 59 million dollars.
III. 53% of the variation in revenue can be explained by variation in time.

(A) I only
(B) II only
(C) III only
(D) I and III
(E) None of the above are valid conclusions.

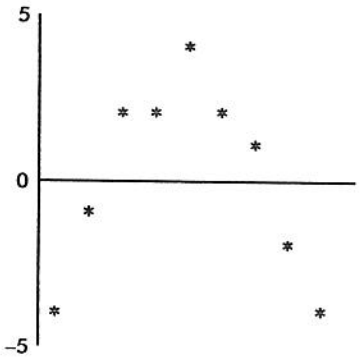
3) Suppose that the scatterplot of log X and log Y shows a strong positive correlation close to 1. Which of the following is true?

I. The variables X and Y also have a correlation close to 1.
II. A scatterplot of the variables X and Y shows a strong nonlinear pattern.
III. The residual plot of the variables X and Y shows a random pattern.

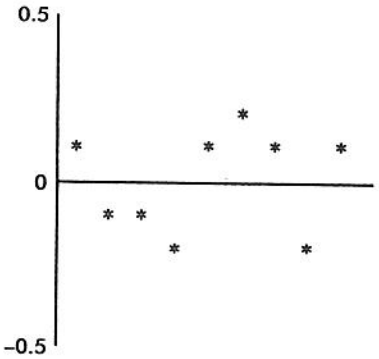
(A) I only
(B) II only
(C) III only
(D) I and II
(E) I, II, and III

Free Response

Fuel economy y (in miles per gallon) is tabulated for various speeds x (in miles per hour) for a certain car model. A linear regression model gives Predicted fuel economy = 34.8 – 0.16 (Speed) with the following residual plot:



A quadratic regression model gives $\hat{y} = -0.0032x^2 + 0.26x + 23.8$ with the following residual plot:



(a) What does each model predict for fuel economy at 50 miles per hour?
(b) Which model is a better fit? Explain.

2) The following data shows an exponential relationship:

x	2	4	6	8	10	12
y	2	4	7	14	28	55

A. Use a transformation that would create a linear relationship.

B. Use the least-squares line of this transformed relationship to predict the value of y when x is 16.