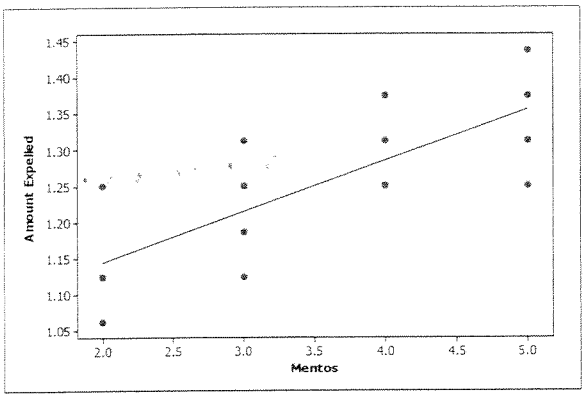
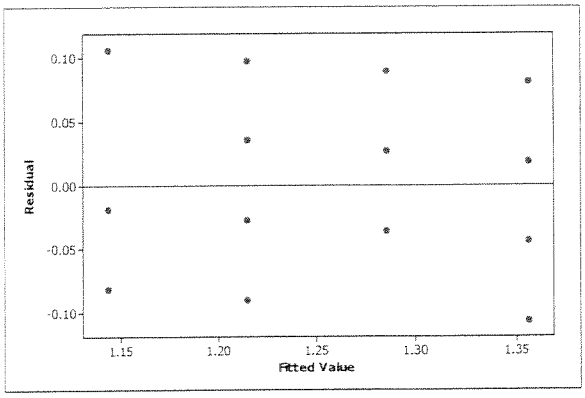
Interpreting Computer Output, Regression to the Mean

Answers

When Mentos are dropped into a newly opened bottle of Diet Coke, carbon dioxide is released from the Diet Coke very rapidly, causing the Diet Coke to be expelled from the bottle. Will more Diet Coke be expelled when there is a larger number of Mentos dropped in the bottle? Two statistics students, Brittany and Allie, decided to find out. Using 16 ounce (2 cup) bottles of Diet Coke, they dropped either 2, 3, 4, or 5 Mentos into a randomly selected bottle, waited for the fizzing to die down, and measured the number of cups remaining in the bottle. Then, they subtracted this measurement from the original amount in the bottle to calculate the amount of Diet Coke expelled (in cups). Output from a regression analysis is shown below.





(a) What is the equation of the least-squares regression line? Define any variables you use.

Predictor	Coef	SE Coef	T	P
Constant	1.00208	0.04511	22.21	0.000
Mentos	0.07083	0.01228	5.77	0.000

S = 0.0672442 R-Sq = 60.2% R-Sq(adj)

Coke expelled = 1.00208 + .07083(mentos)

(b) Interpret the slope of the least-squares regression line.

predicted

For each additional mento added the additional coke expelled is 1.00208 cups.

(c) What is the correlation?

$r = \pm\sqrt{.602} = \pm .7759$, since scatterplot shows positive association $r = .776$

(d) Is a linear model appropriate for this data? Explain.

yes. Scatterplot shows moderate positive linear correlation & residual plot shows no obvious pattern

(e) Would you be willing to use the linear model to predict the amount of Diet Coke expelled when 10 mentos are used? Explain.

No, that is extrapolating beyond our data that has a max of 5 mentors. We don't know if our model is still appropriate.

(f) Calculate and interpret the residual for bottle of diet coke that had 2 mentos and lost 1.25 cups.

$\widehat{coke} = 1.00208 + .07083(2) = 1.14$

residual $= 1.25 - 1.14 = .11$

The actual coke expelled is .11 cups more than predicted from the LSRL of coke on mentos.

(g) Interpret the values of r^2 and s.

$r^2 = 60.2\%$. 60% of the variation in coke expelled is explained by the LSRL of coke on mentos. The ~~predicted~~ predicted value is typically off by .067 cups. per mento coke expelled

(h) If the amount expelled was measured in ounces instead of cups, how would the values of r^2 and s be affected? Explain.

r^2 is unitless so it would not change

s is measured in cups so it would increase $.067(8) = .536$ ounces.