Computer Printout Practice

Name _____

1. The Minnesota Dept. of Transportation hoped that they could measure the weights of big trucks without actually stopping the vehicles by using a newly developed "weight-in-motion" scale. To see if the new device was accurate, they conducted a calibration test. They weighed several trucks when stopped (static weight). They weighed them again while the trucks were moving to see how well the new scale could estimate the weight. A regression printout is shown below:

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The regression equation is
Static Weight = 10.9 + 0.638 Weight in Motion (thousands of pounds)

Predictor        Coef       StDev          T        P
Constant       10.854       1.982       5.48    0.001
Weight i      0.63791     0.06103      10.45    0.000

S = 1.041       R-Sq = 93.2%     R-Sq(adj) = 92.3%
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   a. What is the value of the correlation coefficient? _____

   b. Interpret the correlation coefficient in the context of the situation.

   c. Interpret the slope in the context of the situation.

   d. What is the predicted static weight for a truck that weighs 28,000 pounds?

e. What is the residual for the truck that has a static weight of 27.8 and weight-in-motion of 25.1 (thousand pounds)?

f. Interpret r^2 in the context of the situation.

2. Times and distances of olympian athletes competing in two heptathlon events were recorded: the high jump and the 800 meters race. A linear regresion was performed on the data, and the computer output is below.

High Jump(meters) = 2.6809416 - 0.0067136(800-m time(in seconds))

Term	**Estimate**	**Std Error**	**t Ratio**	**Prob>|t|**
Intercept	2.6809416	0.422459	6.35	<.0001
800-m (sec)	-0.006714	0.003094	-2.17	0.0401

RSquare	0.164012
RSquare Adj	0.12918
Root Mean Square Error	0.061688
Mean of Response	1.764615
Observations (or Sum Wgts)	26

a. Define the explanatory and response variables.

b. Write the equation of the least-squares regression line.

c. What is the value of r? _____

d. Interpret r in the context of the problem.

e. What is the predicted high jump for a 800 meter race time of 139.56 seconds?

f. What is the residual for an olympian that has a 800-meter time of 133.69 seconds and a high jump of 1.7 meters?

g. Does the regression line under- or over-predict the high jump distance of the athlete in (f)? Explain.

h. Find r^2 and interpret in context.

Answers:

1 a. $r = .965$
   b. Assuming the association is linear, $r = .965$ indicates there is a strong, positive linear association between static weight and weight in motion.
   c. For every additional thousand pounds of weight in motion of a big truck, our model would predict appoximately an additional 638 pounds of static weight.
   d. ≈ 28,764 pounds
   e. ≈ 934 pounds (depending on rounding)
   f. 93.2% of the variation in static weight can be attributed to the linear model on weight in motion.

2. a. The explanatory variable is the 800-meter race times, and the response variable is the high jump distances.
   b. $\widehat{\text{high jump distance}} = 2.681 - .0067(\text{800m time in seconds})$
   c. –.405
   d. Assuming the association is linear, $r = .405$ indicates there is a weak, negative association between heptathlon athletes' times in the 800 meter race and their high jump distances.
   e. ≈ 1.744 meters
   f. ≈ –.0834 meters
   g. The regression line would over-predict the high jump distance. A negative residual indicates the actual high jump distance is below the least squares line, thus the line has over-predicted the high jump value.
   h. 16.4% of the variation in high jump distances of olympic heptathlon athletes can be attributed to a linear model on their 800-meter race times.