THEORY

1. As part of regression analysis, why do we want to test whether or not $\beta_1 = 0$?
   A. It is the way to see if the y-intercept is zero
   B. It is the way to see if the assumptions hold
   C. It is the way to see if X and Y are linearly related
   D. It is the way to see if X is the only possible predictor for Y
   E. It is the way to see if the t distribution holds

2. A 95% C.I. for a regression slope is always:
   A. Symmetrical around b_0
   B. Symmetrical around b_1
   C. Calculated using the F distribution
   D. Calculated using the z distribution
   E. Non-symmetrical

PROBLEM.

Consider data on the index of Output per Hour (*X*) (a metric for measuring labor productivity), in relation to the index of Real Compensation per Hour (*Y*) (a metric for wages), taken from Table B-47, pg. 362 of the *US Economic Report to the President* (*2000*) for the years 1959-1998. The year 1992 with $(X, Y) = (100, 100)$ is considered the base of the indexes. We propose that productivity is related to wages as: $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$. We have conducted some preliminary analysis, the results for which are provided in the tables and graphs below. Please answer the questions, which follow.

Regression Analysis: Y versus X

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The regression equation is
Y = 29.5 + 0.714 X

Predictor      Coef  SE Coef      T      P
Constant     29.519    1.942  15.20  0.000
X           0.71366  0.02410  29.61  0.000

S = 2.67553   R-Sq = 95.8%   R-Sq(adj) = 95.7%

Analysis of Variance

Source          DF      SS      MS       F      P
Regression       1  6274.8  6274.8  876.55  0.000
Residual Error  **   272.0     7.2
Total           39  6546.8
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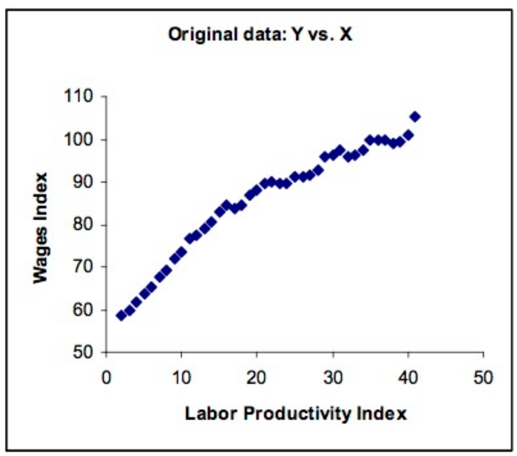

3. Based on this regression output, each unit increase in Labor Productivity Index:
   A. Is associated with a unit increase in Wages Index.
   B. Is associated with an increase in Wages Index by 29.5 units.
   C. Is associated with a decrease in Wages Index by 29.5 units.
   D. Is associated with an increase in Wages Index by 0.714 units.
   E. Is associated with a decrease in Wages Index by 0.714 units.

4. The Sum of Squared Y variability explained by this model is equal to:
   A. 6274.8
   B. 272.0
   C. 6546.8
   D. 7.2
   E. 876.55

5. The standard deviation of the residuals is equal to:
   A. 2.68 B. 95.8 C. 95.7 D. 7.2 E. 0.0241

6. The null and alternative hypotheses of the overall regression model F test are:
   A. Ho: $\beta_1 = 0$ Ha: $\beta_1 \geq 0$
   B. Ho: $\beta_0 = 0$ Ha: $\beta_0 \geq 0$
   C. Ho: $\beta_0 = \beta_1$ Ha: $\beta_0 \neq \beta_1$
   D. Ho: $\beta_0 = \beta_1 = 0$ Ha: β_0 and β_1 are not both zero
   E. Ho: $\beta_1 = 0$ Ha: $\beta_1 \neq 0$

7. Based on the regression analysis output shown above, the observed F value of the overall regression model F test appears to be:
   A. Too large, supporting acceptance of the null hypothesis.
   B. Too small, supporting acceptance of the null hypothesis.
   C. Too small, supporting rejection of the null hypothesis.
   D. Too large, supporting rejection of the null hypothesis.

8. The null and alternative hypotheses of the default t-test for the regression slope are:
   A. Ho: $\beta_1 = 0$ Ha: $\beta_1 \geq 0$
   B. Ho: $\beta_0 = 0$ Ha: $\beta_0 \geq 0$
   C. Ho: $\beta_0 = \beta_1$ Ha: $\beta_0 \neq \beta_1$
   D. Ho: $\beta_0 = \beta_1 = 0$ Ha: β_0 and β_1 are not both zero
   E. Ho: $\beta_1 = 0$ Ha: $\beta_1 \neq 0$

9. Based on the regression analysis output shown above, the p-value of the t-test for the slope coefficient is:
   A. Too large, supporting acceptance of the null hypothesis.
   B. Too large, supporting rejection of the null hypothesis.
   C. Too small, supporting rejection of the null hypothesis.
   D. Too small, supporting acceptance of the null hypothesis.
   E. Too small, supporting rejection of the alternative hypothesis.

10. The error (residual) degrees of freedom are equal to:
    A. 39 B. 38 C. 1 D. 40 E. 0

ANSWERS: 1-C, 2-B, 3-D, 4-A, 5-A, 6-E, 7-D, 8-E, 9-C, 10-B.