Problem 1: Thirty Data Points

1. Thirty data points on *Y* and *X* are employed to estimate the parameters in the linear relation *Y* = *a* + *bX*. The computer output from the regression analysis is

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| DEPENDENT VARIABLE: Y R-SQUARE F-RATIO P-VALUE ON F |
|  OBSERVATIONS: 30 0.3301 13.79 0.0009 |
|  VARIABLE PARAMETER STANDARD T-RATIO P-VALUE |
|  ESTIMATE ERROR |
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|  INTERCEPT 93.54 46.210 2.02 0.0526 |
|  X –3.25 0.875 –3.71 0.0009 |
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1. The equation of the sample regression line is *Y*ˆ = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. There are \_\_\_\_\_\_ degrees of freedom for the *t*-test. At the 1% level of significance, the critical *t*-value for the test is \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. At the 1% level of significance, *a*ˆ \_\_\_\_\_\_\_\_\_\_ (is, is not) significant, and *b*ˆ \_\_\_\_\_\_\_\_ (is, is not) significant.
4. At the 2% level of significance, the critical *t*-value for a *t*-test is \_\_\_\_\_\_\_\_\_\_\_. At the 2% level of significance, ˆ *a* \_\_\_\_\_\_\_\_\_\_\_\_ (is, is not) significant, and *b*ˆ \_\_\_\_\_\_\_\_\_\_\_\_ (is, is not) significant.
5. The *p*-value for *b*ˆ indicates that the exact level of significance is \_\_\_\_\_\_ percent, which is the probability of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. At the 1% level of significance, the critical value of the *F*-statistic is \_\_\_\_\_\_\_\_\_\_. The model as a whole \_\_\_\_\_\_\_\_\_\_\_\_\_\_(is, is not) significant at the 1% level.
7. If *X* equals 500, the fitted (or predicted) value of *Y* is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
8. The percentage of the total variation in *Y not* explained by the regression is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ percent.
9. Explain why it is necessary to assess the statistical significance of the parameter estimates.