Regression and Transformed Data

Section 4.1 – Exponential Models

Consider the following data of average movie ticket prices.

(source: http://natoonline.org/data/ticket-price/)

|  |  |  |
| --- | --- | --- |
| **Year** | **Cost of Movie Ticket** |  |
| 1948 | $0.36 |  |
| 1958 | $0.68 |  |
| 1968 | $1.22 |  |
| 1978 | $2.37 |  |
| 1988 | $4.11 |  |

1. Draw a rough scatterplot.
2. Note, the data **do not** appear to be linear. Calculate r2 and make a residual plot in your calculator. What do these two items tell you about the linearity of our original data?
3. I believe that this data is growing exponentially. Test this theory by checking the ratios $\frac{y\_{n}}{y\_{n-1}}$.
4. Since we believe the data might be exponential, take the log of only the y variable. Fill in the chart at the top of the page.
5. Draw a rough scatterplot of this transformed data.
6. Find the LSRL of the transformed data. Is this a good idea? Reference your transformed scatterplot and r2?
7. Draw a rough residual plot. What do you think about this plot?
8. Use your regression line to find a prediction of the cost of movie tickets today.
9. Look up the average cost of a movie ticket today. Why is our prediction so far from the actual cost?
10. "Untransform" your LSRL to find a regression equation in terms of x and y instead of x and log y.
11. Use the untransformed equation to predict the cost of a movie ticket today (you should get the same answer…allow for some rounding error).