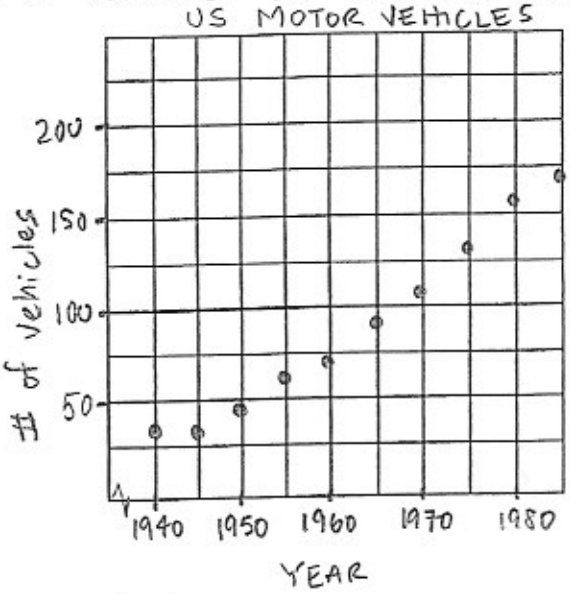
Activity 4.1 Q A.P. Statistics

The number of motor vehicles registered in the U.S. has grown as follows:

Year	Vehicles	Year	Vehicles
1940	32.4	1965	90.4
1945	31.0	1970	108.4
1950	49.2	1975	132.9
1955	62.7	1980	155.8
1960	73.9	1985	171.7

1. Plot the number of vehicles vs. time



2. Describe what you see.

I see a very strong pattern in the data, which has a positive association. As far as the form, however, I am not sure if the data slightly curved with no outliers, or linear, with 1940 being a possible outlier.

3. Calculate the LSRL.

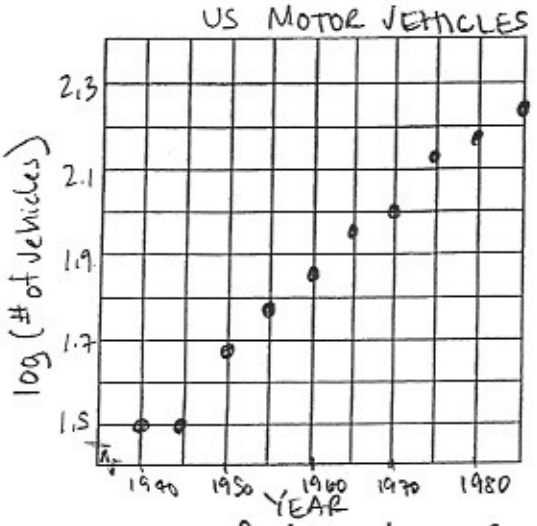
$\widehat{\#\text{ of Vehicles}} = -6330.4600 + 3.27.20\,\text{year}$

4. Calculate r and R^2 and discuss.

$r = .9875$ and indicates the line is positive and the data closely follows the line.

$r^2 = .9751$ and says that 97.51% of the variation in #Vehicles is explained by the least squares regression of vehicles on year.

5. We suspect the data is exponential. Transform by taking the logs of: number of vehicles. Plot the transformed data.



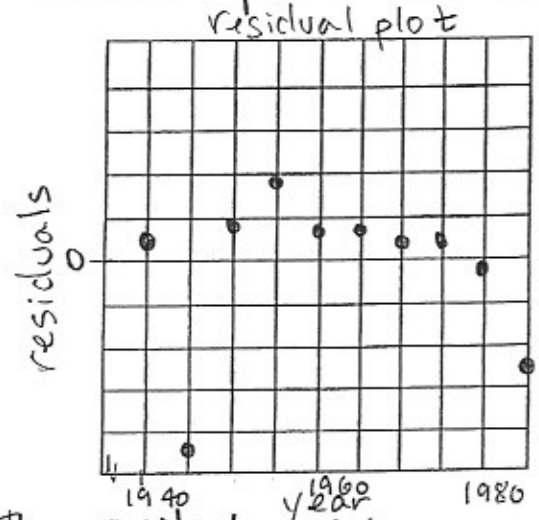
6. Calculate the LSRL of the transformed data

$\widehat{\log \text{Vehicles}} = -32.3289 + .01744\ \text{year}$

7. Calculate r and R^2 and discuss (compare to #4)

$r = .9887$ and $R^2 = .9774$ which are each slightly better than with the linear model

8. Create a residual plot of the transformed data



9. Discuss the residual plot

There seems to be a pattern so fitting a line to the transformed data is not the best idea

10. Write the exponential model (solve for $\hat{y}$).

$\widehat{\text{Vehicles}} = 10^{-32.3289 + .01744\ \text{year}}$

11. Use your model to predict the number of Vehicles in 2006.

The model predicts about 445 (445.3180) Vehicles in 2006.