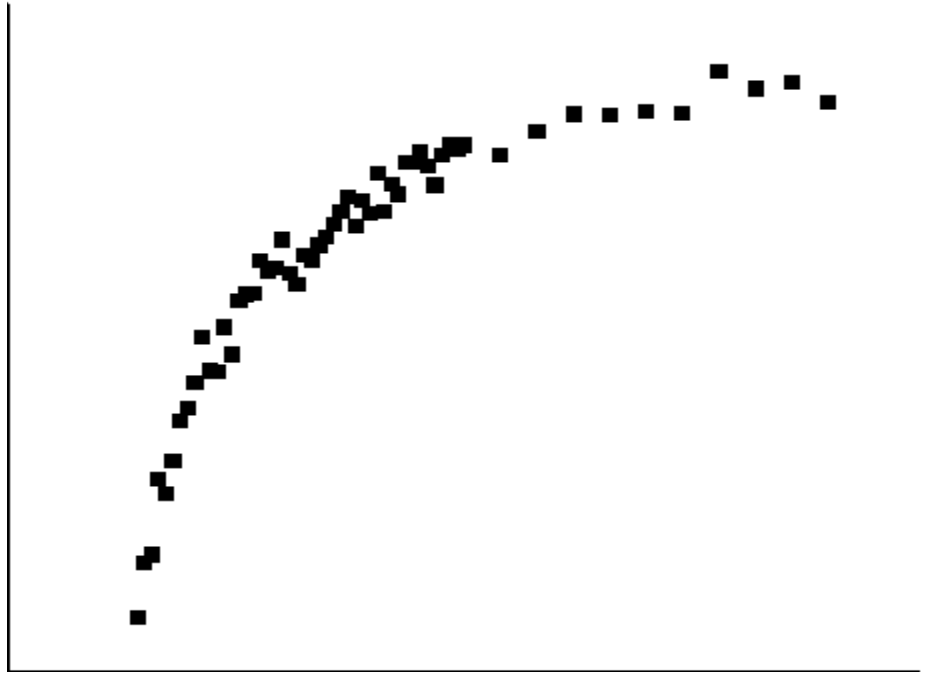
Assumptions of Linear Regression

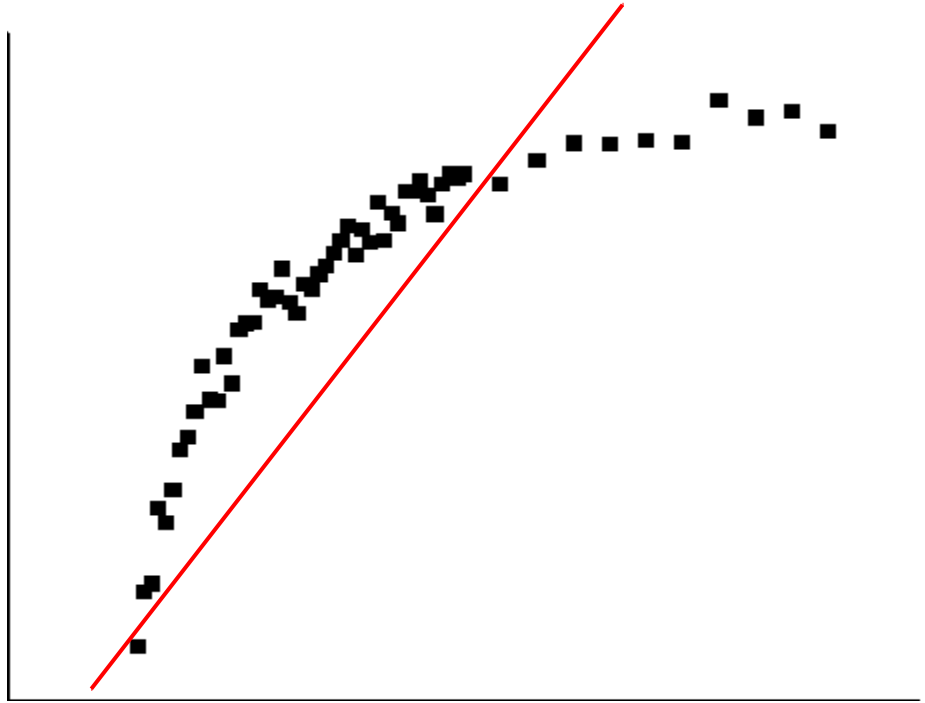
Assumptions of Linear Regression

- Linear Relationship
- No Correlation of Error Terms
- Constant Variance of Error Terms
- No Correlation among Independent Variables
- Errors Normally distributed

Linear Relationship



Linear Relationship



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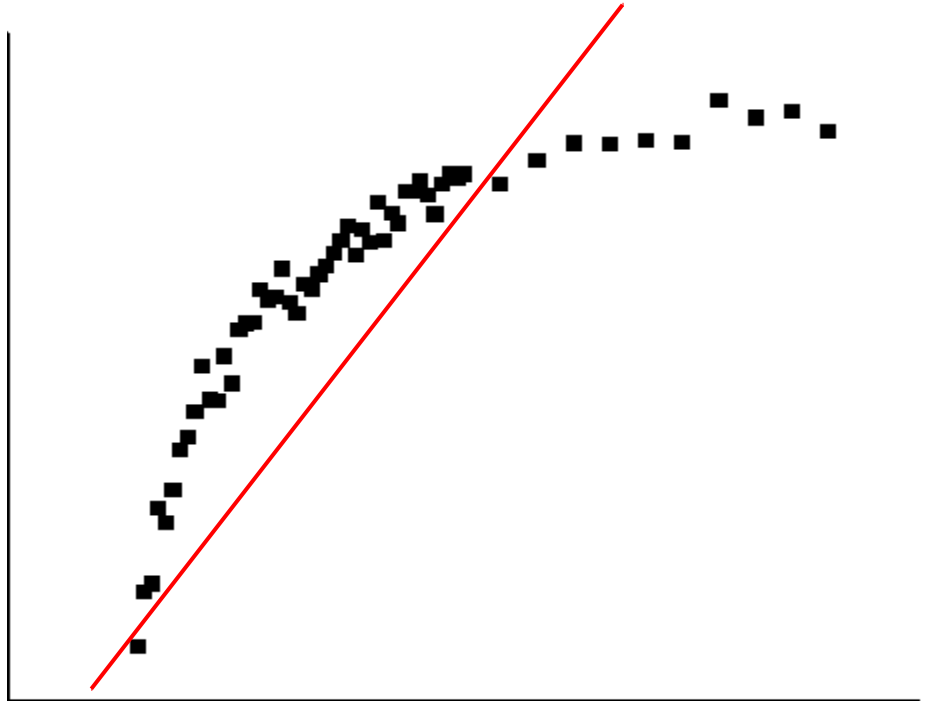
Linear Relationship

- Transform using log(X), √X, and X^2



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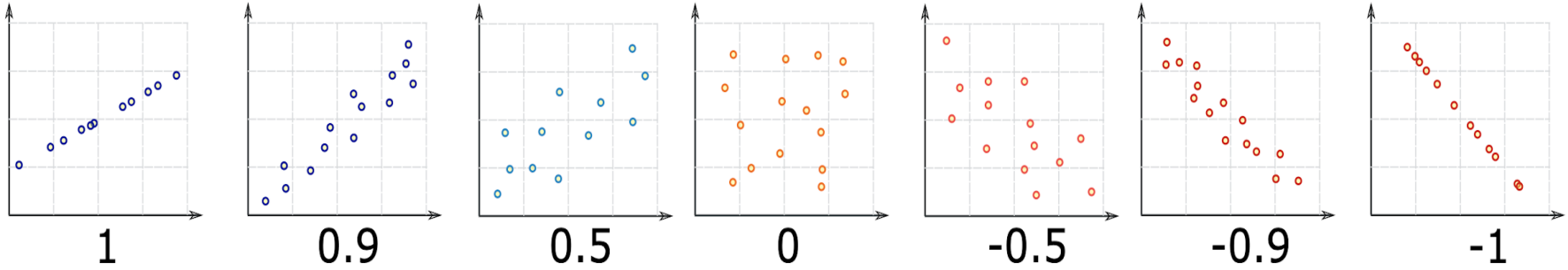
Correlation of Error Terms

Correlation of Error Terms



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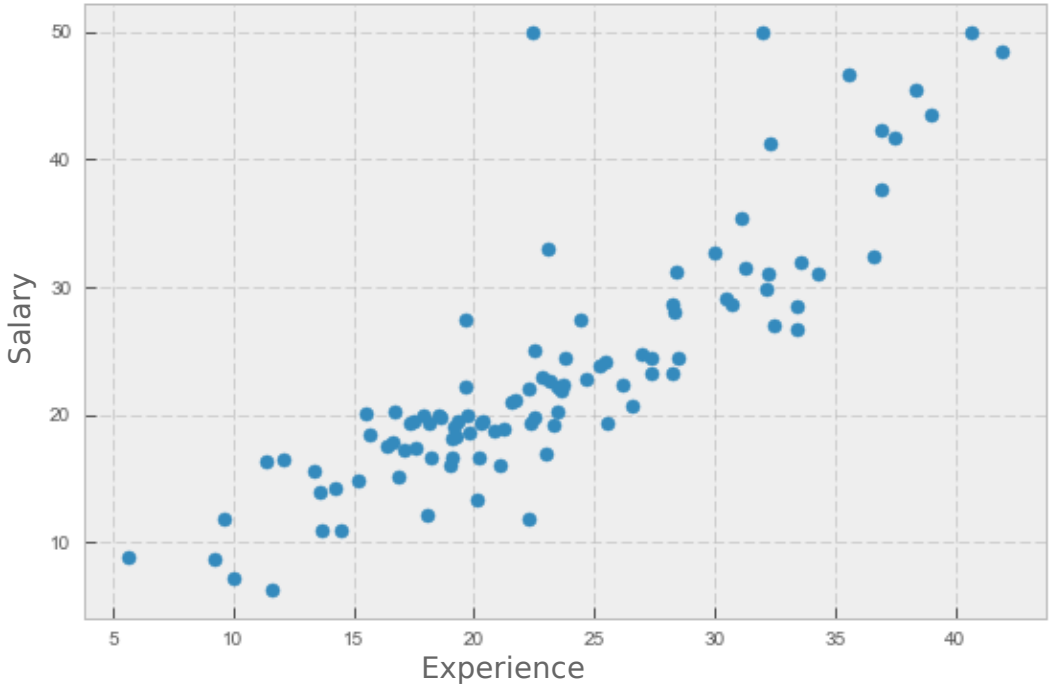
Correlation of Error Terms



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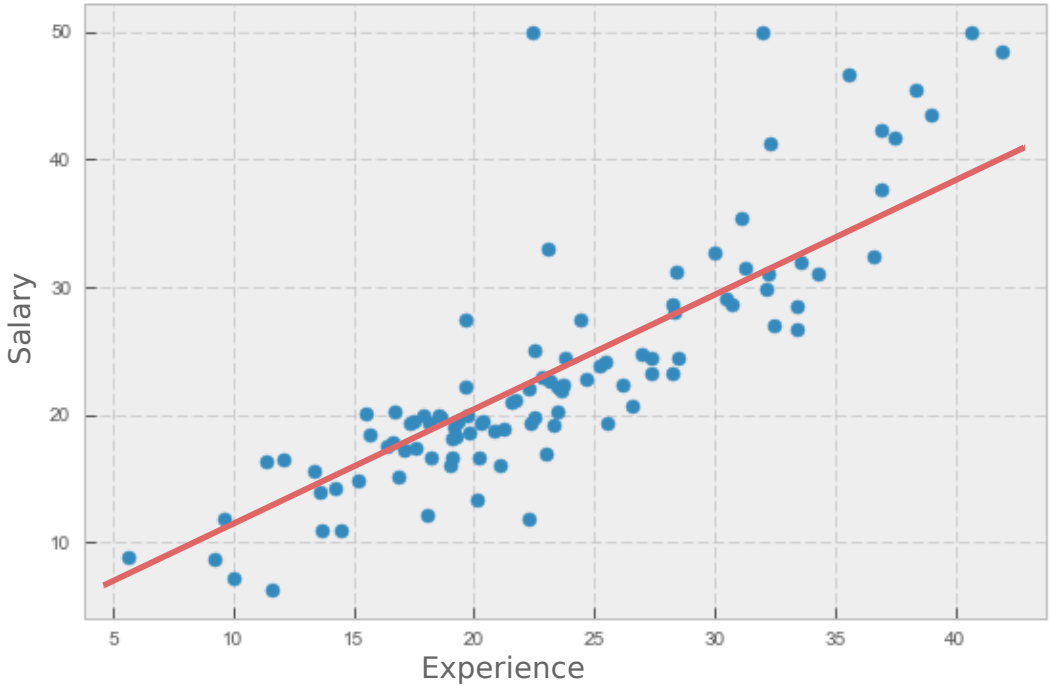
Correlation of Error Terms



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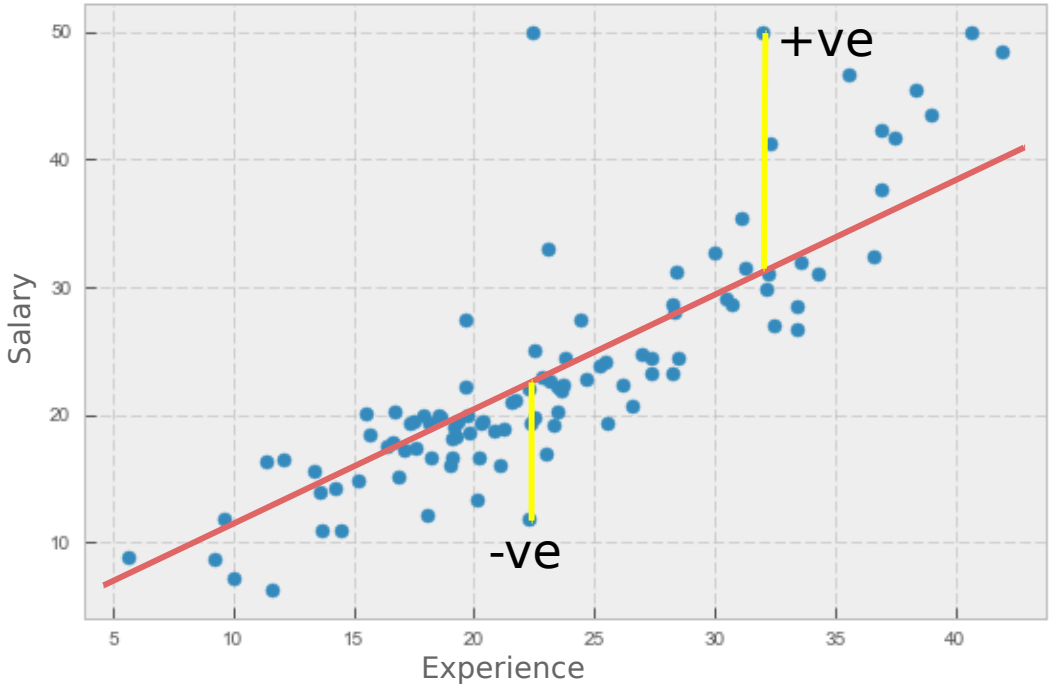
Correlation of Error Terms



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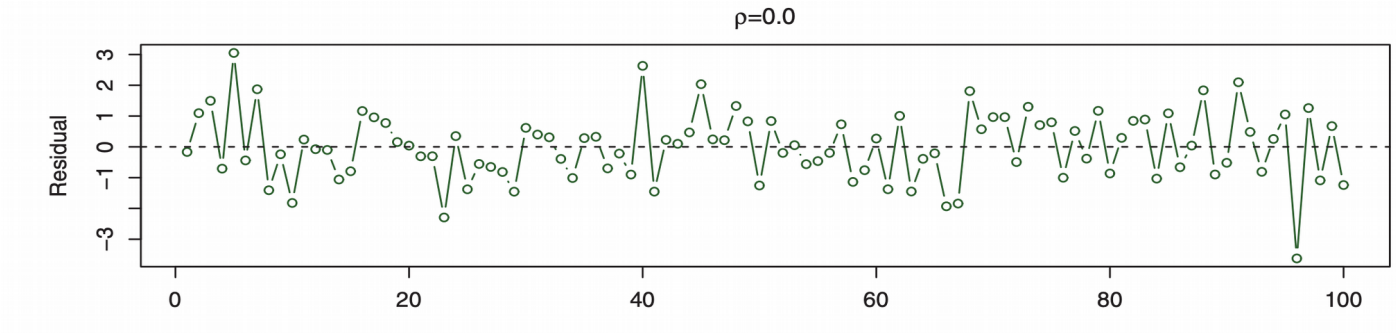
Correlation of Error Terms



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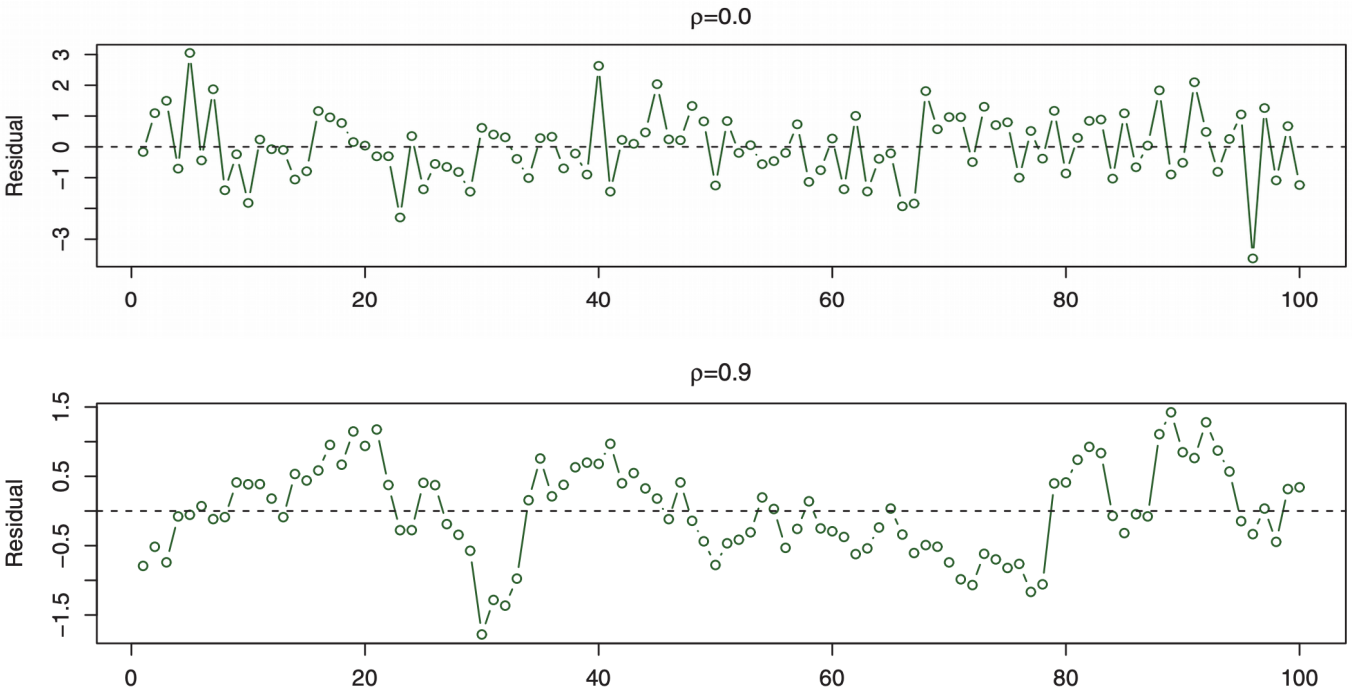
Correlation of Error Terms



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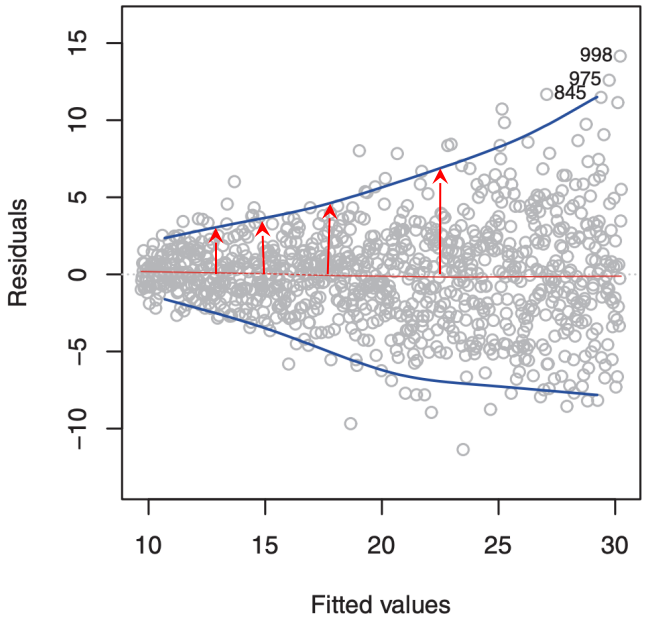
Constant Variance of Error

Constant Variance of Error



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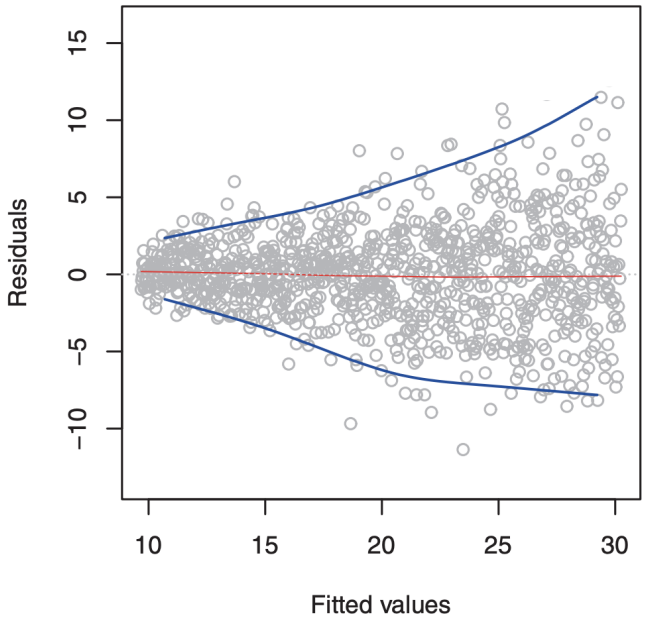
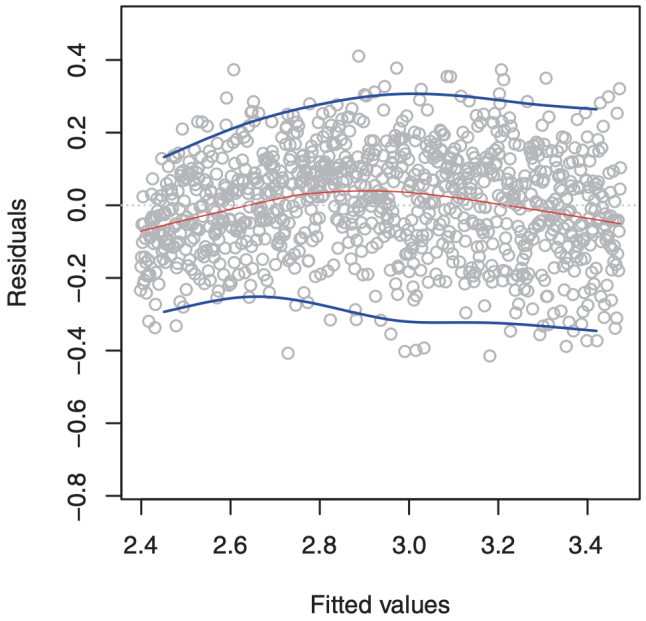
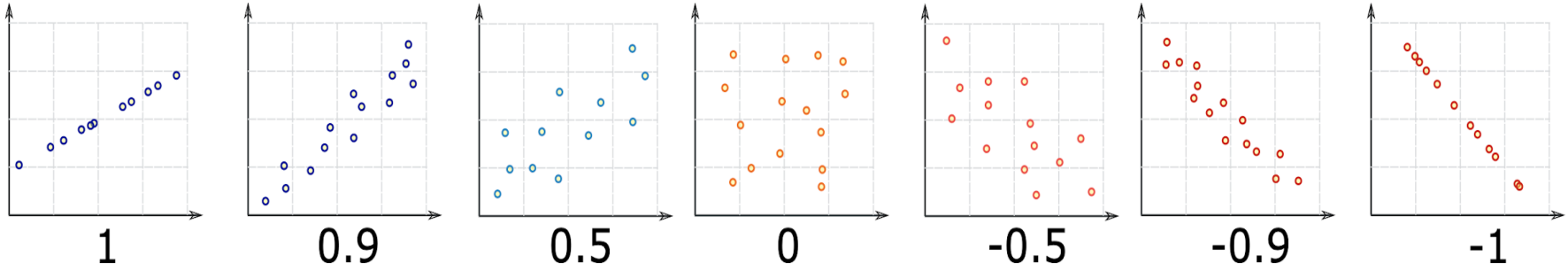
Constant Variance of Error





Multi-Collinearity

Multi-Collinearity



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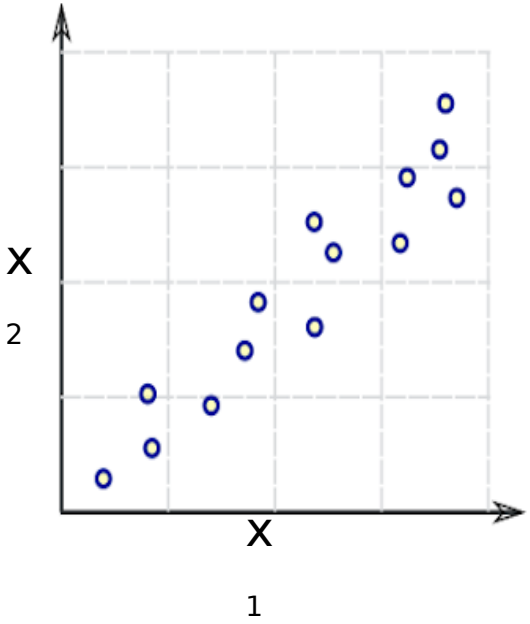
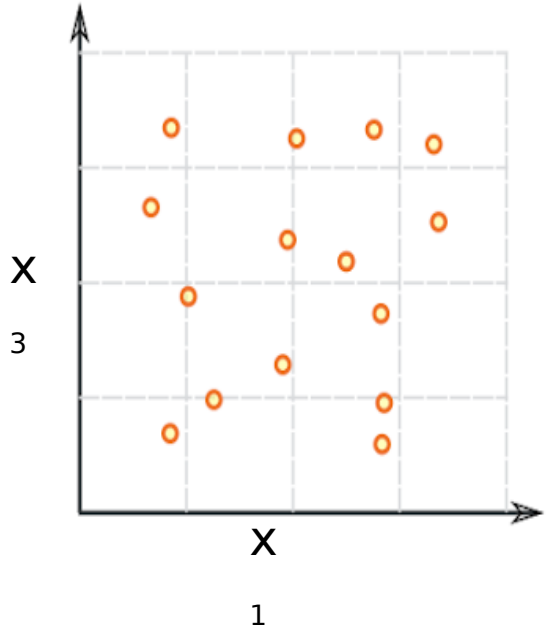
Multi-Collinearity





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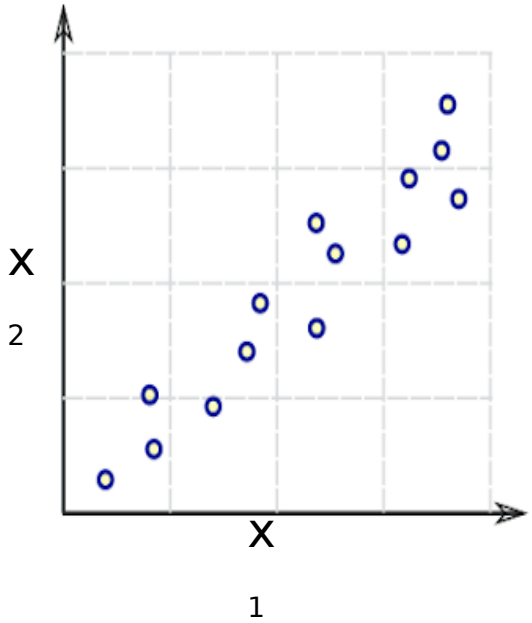
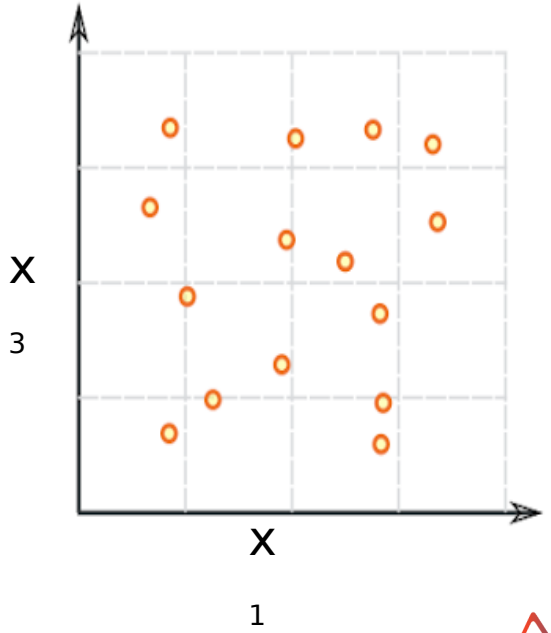
Multi-Collinearity

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + b$$





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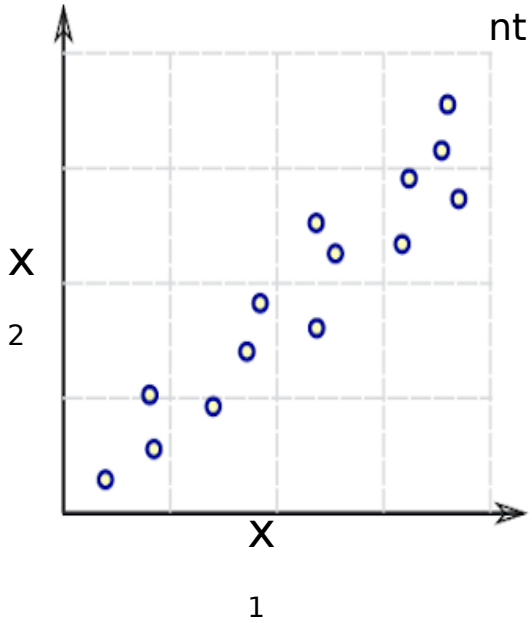
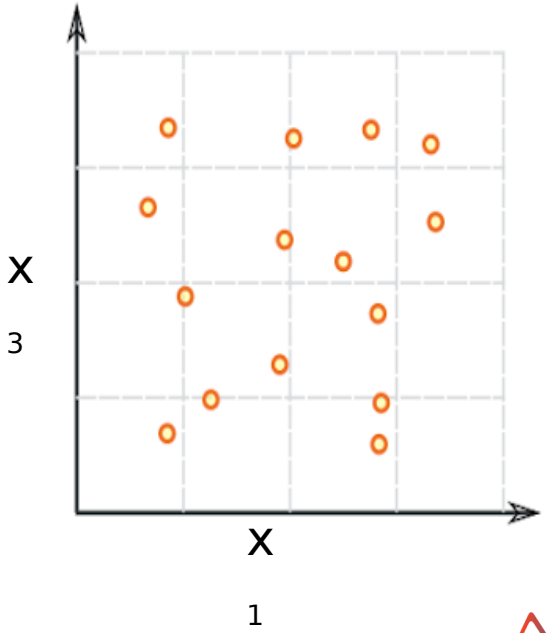
Multi-Collinearity

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + b$$

constant





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Multi-Collinearity

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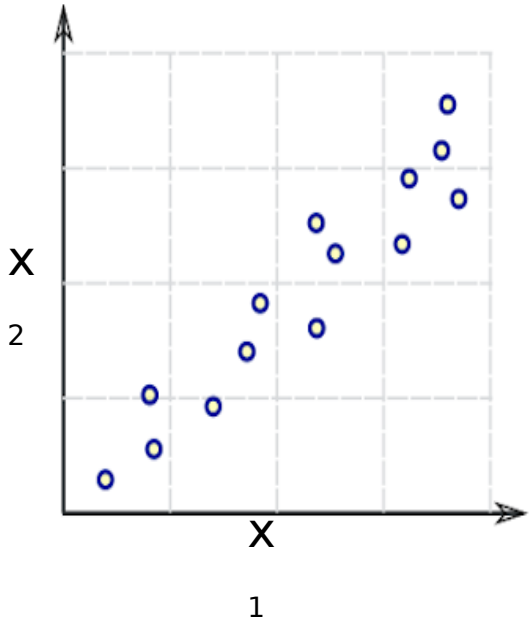
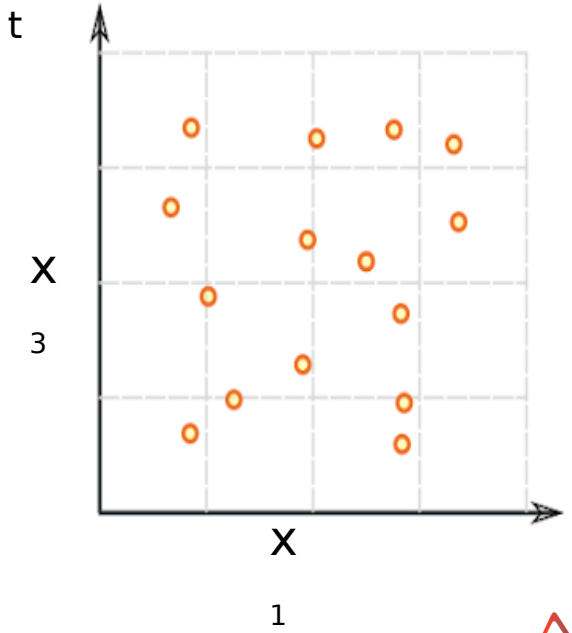
constant





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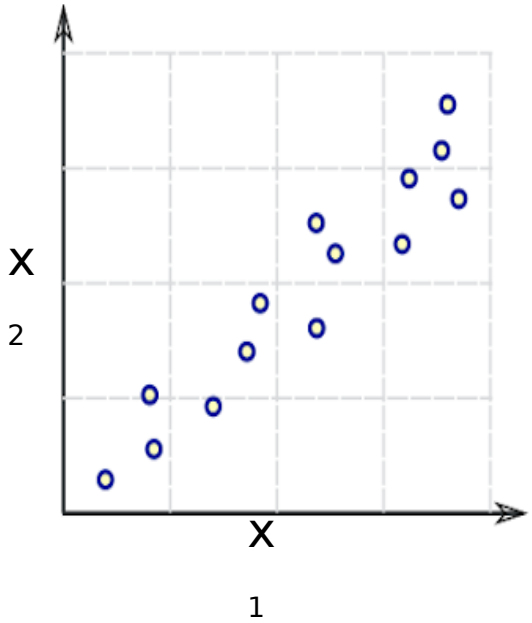
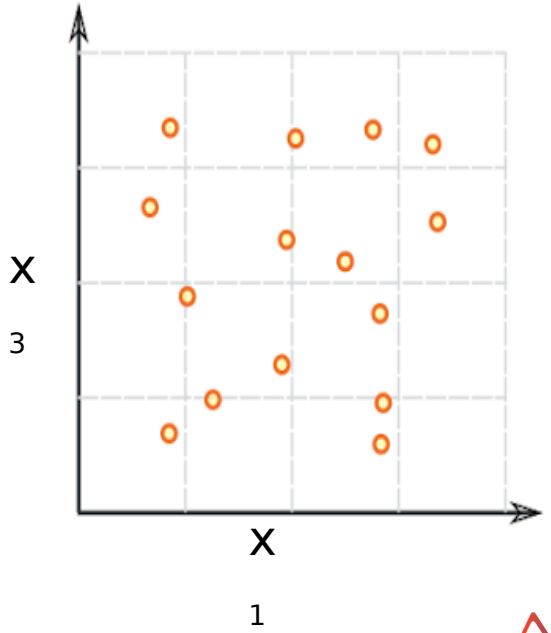
Multi-Collinearity

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + b$$





?

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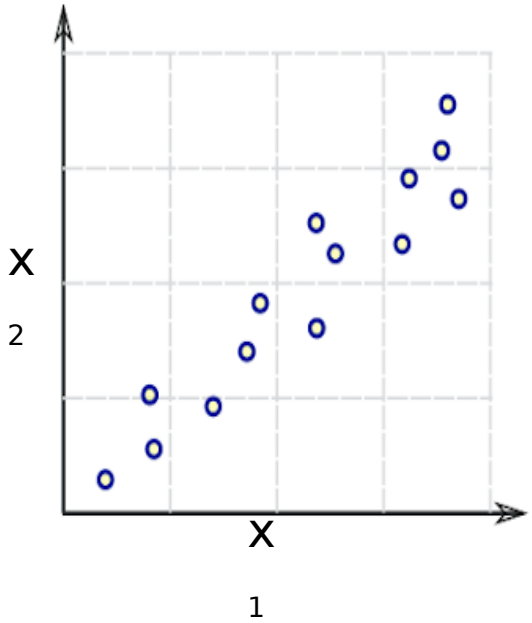
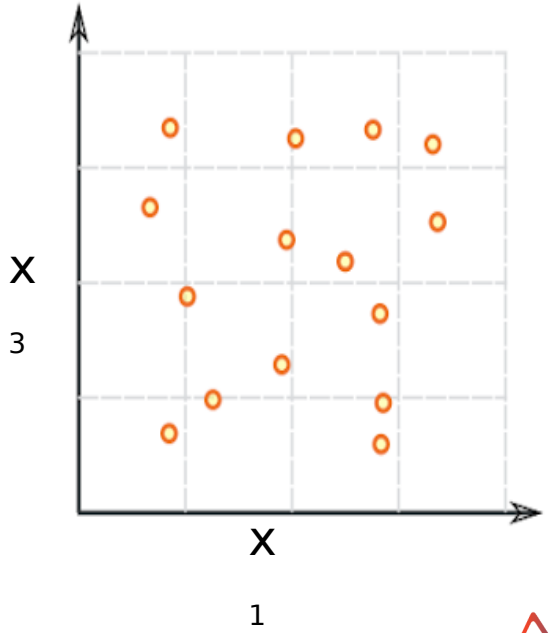
Multi-Collinearity

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + b$$

eliminate





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Multi-Collinearity: VIF

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- Used for diagnosing collinearity/multicollinearity

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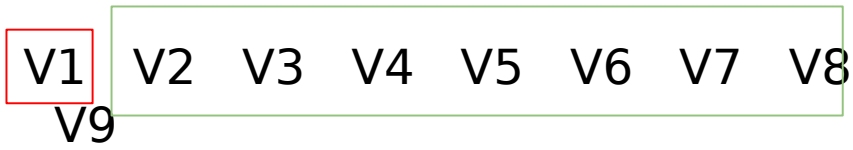
- Quantifies correlation b/w one and other predictor



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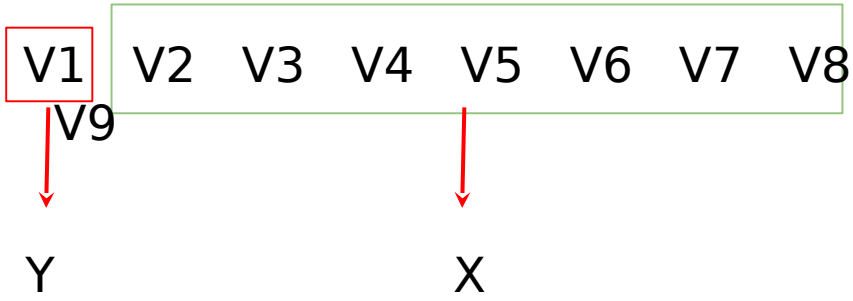
Multi-Collinearity: VIF

- Used for diagnosing collinearity/multicollinearity
- Quantifies correlation b/w one and other predictors
- Higher value -> Difficult interpretation of estimates

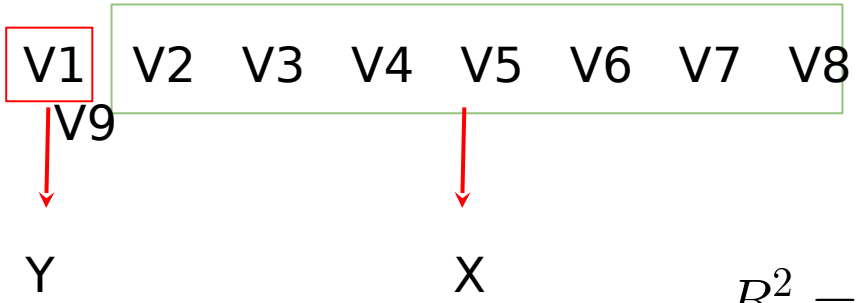
Multi-Collinearity: VIF

V1 V2 V3 V4 V5 V6 V7 V8
V9

Multi-Collinearity: VIF



Multi-Collinearity: VIF



$$R^2 = 1 - \frac{\text{MSE(model)}}{\text{MSE(baseline)}}$$

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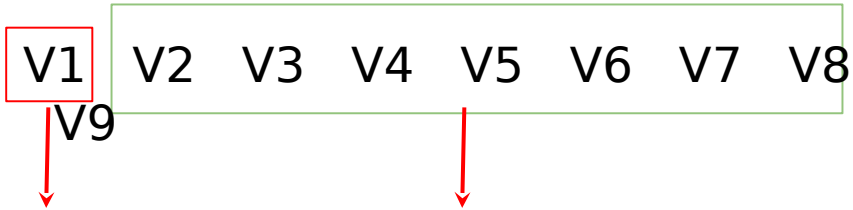
Multi-Collinearity: VIF



$$R^2 = 1 - \frac{\text{MSE(model)}}{\text{MSE(baseline)}}$$

$$VIF = \frac{1}{1 - R^2}$$

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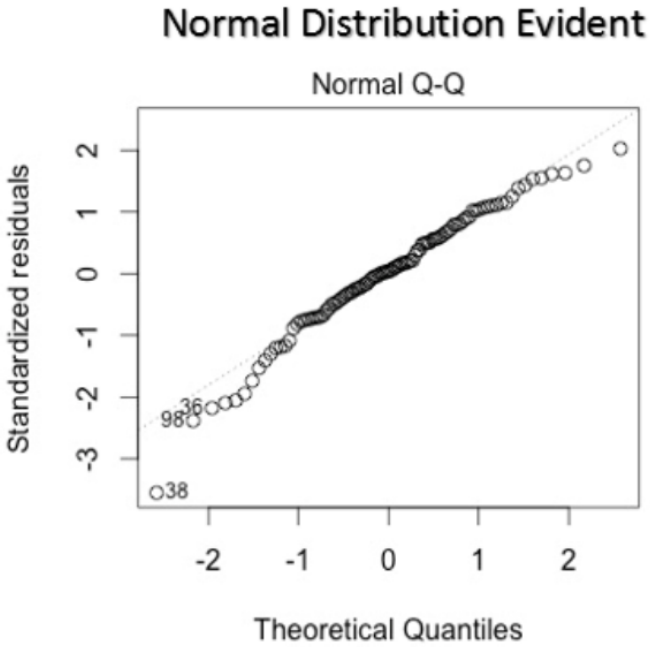
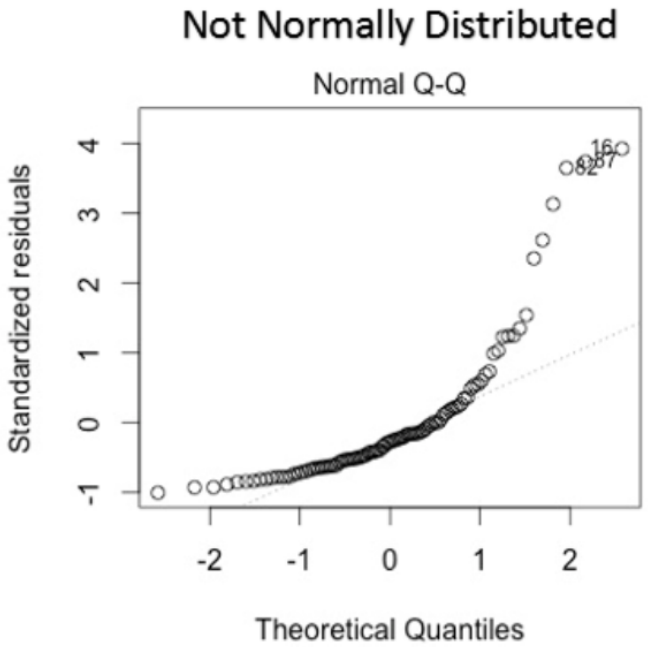
Normal Distribution of Errors





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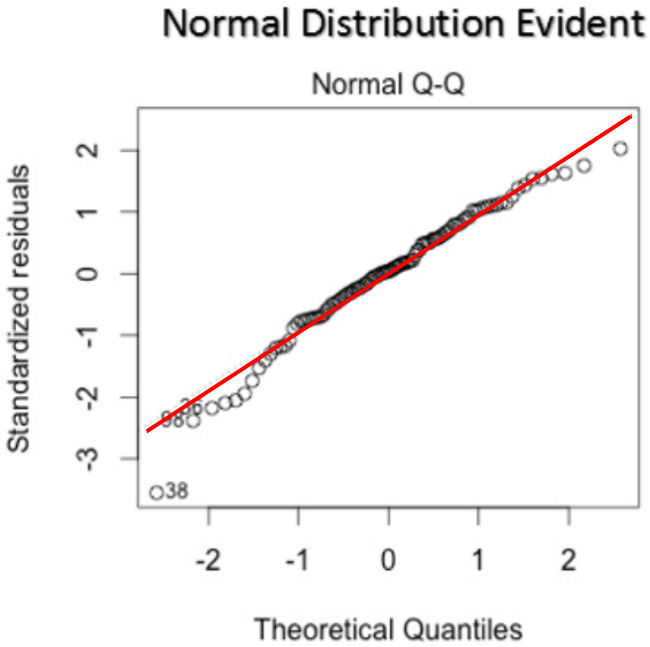

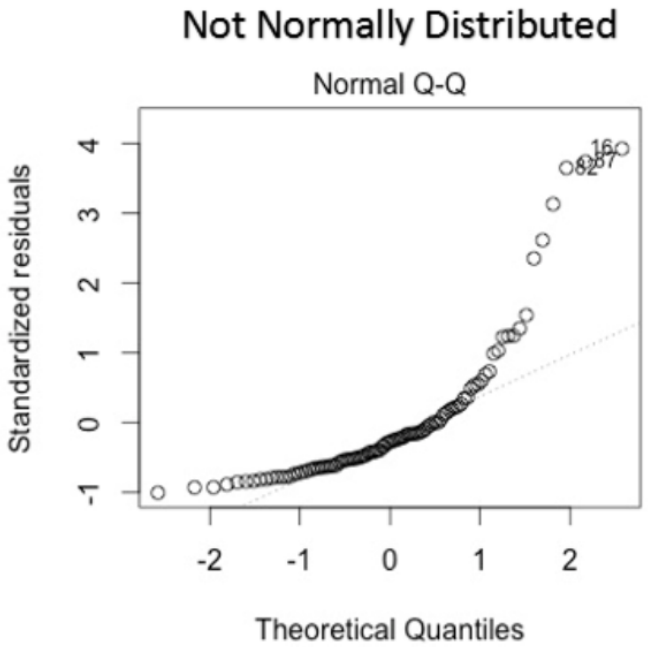

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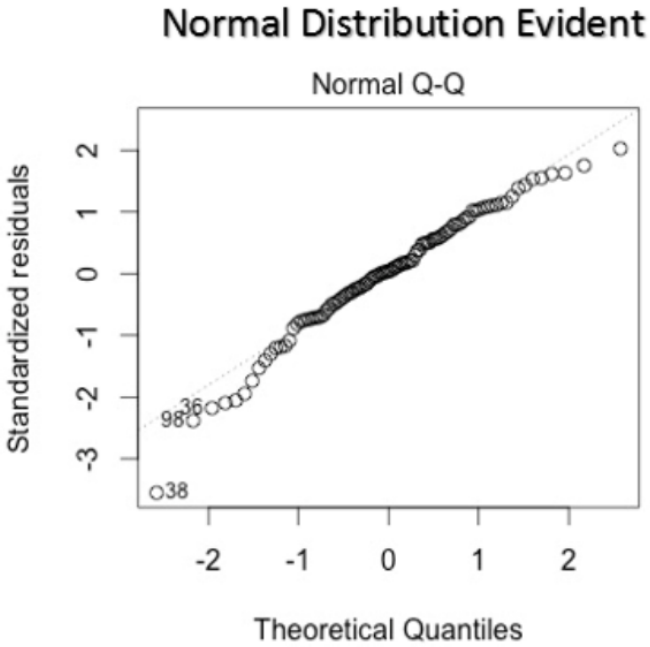
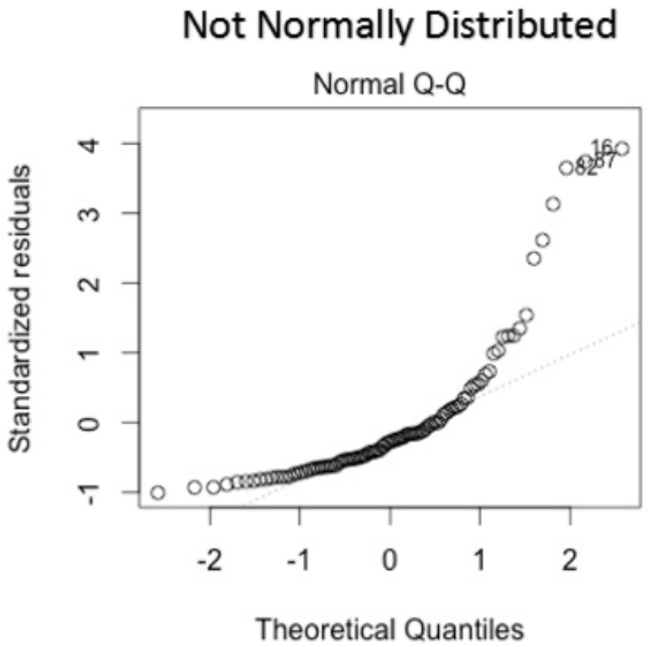
Normal Distribution of Errors





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