

# Adequacy of Linear Regression Models: Introduction



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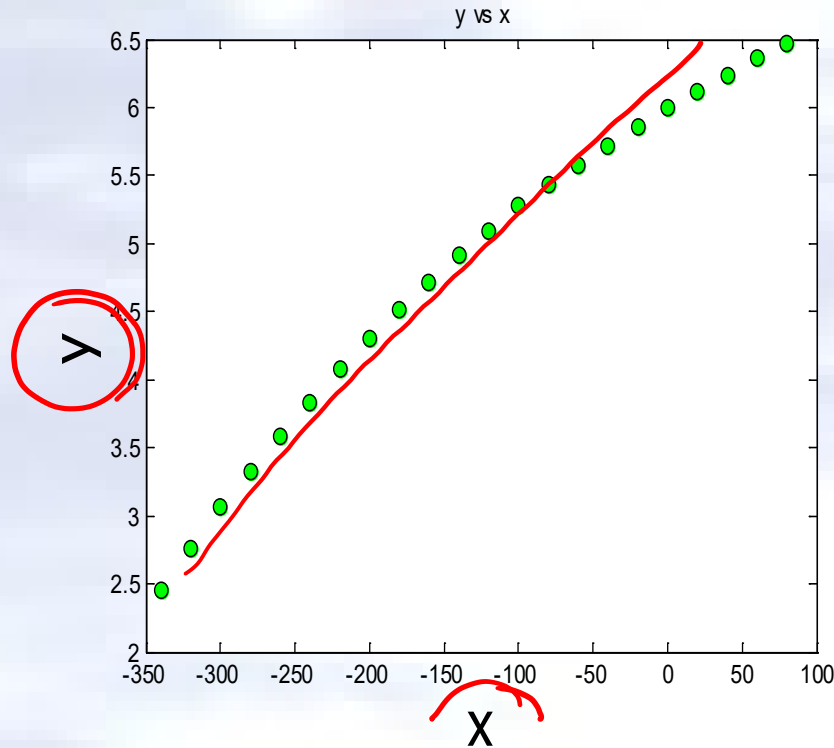


For more details on this topic

- Go to <http://nm.MathForCollege.com>
- Click on Adequacy of Regression Model



# Data



$$Y = a_0 + a_1 X$$

$$a_0 = \frac{\sum_{i=1}^n x_i^2 \sum_{i=1}^n y_i - \sum_{i=1}^n x_i \sum_{i=1}^n x_i y_i}{n \sum_{i=1}^n x_i^2 - (\sum_{i=1}^n x_i)^2}$$

$$a_1 = \frac{n \sum_{i=1}^n x_i y_i - \sum_{i=1}^n x_i \sum_{i=1}^n y_i}{n \sum_{i=1}^n x_i^2 - (\sum_{i=1}^n x_i)^2}$$

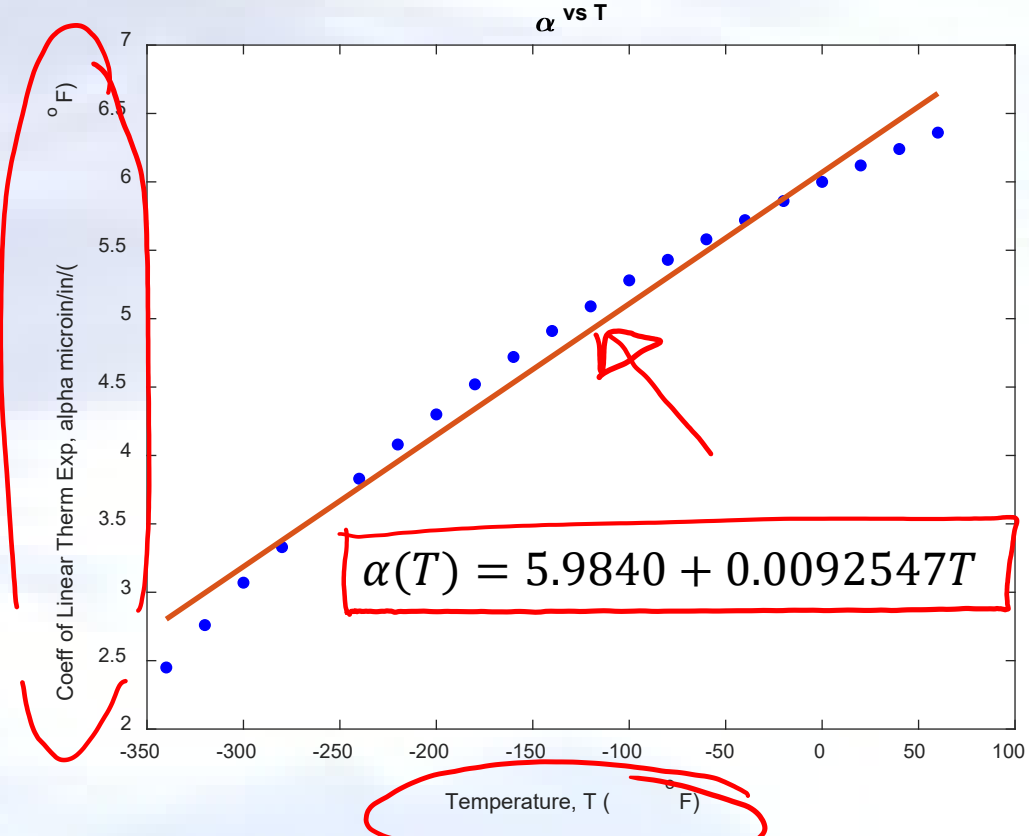


# Coeff of linear thermal expansion vs temperature

T	$\alpha$
80	6.47
60	6.36
40	6.24
20	6.12
0	6.00
-20	5.86
-40	5.2
-60	5.58
-80	5.43
-100	5.28
-120	5.09

T	$\alpha$
-140	4.91
-160	4.72
-180	4.52
-200	4.30
-220	4.08
-240	3.83
-260	3.58
-280	3.33
-300	3.07
-320	2.76
-340	2.45

T is in °F  
 $\alpha$  is in  $\mu\text{in}/\text{in}/^\circ\text{F}$



Is this adequate?



# Quality of Fitted Data

- Does the model describe the data adequately?
- How well does the model predict the response variable predictably?



# Linear Regression Models

- **Limit our discussion to adequacy of straight-line regression models**



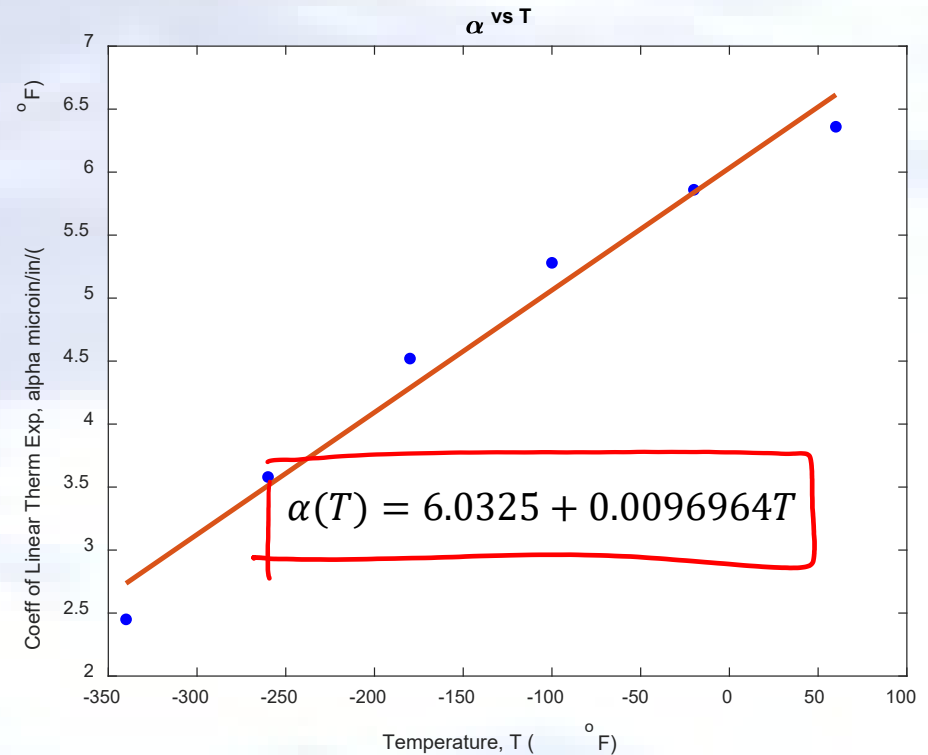
# Four checks

1. Check visually the data and the model. ✓
2. Check if scaled residuals are between  $-2$  and  $2$ . ✓
3. Check how close the coefficient of determination is to  $1$ . ✓ ←
4. Check if the model meets the assumption of random errors. ✓



# Data and Model

T °F	$\alpha$ $\mu\text{in}/\text{in}/^\circ\text{F}$
-340	2.45
-260	3.58
-180	4.52
-100	5.28
-20	5.86
60	6.36



END



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