




Tutorial 6

Question 1

(11.4) Auditors are often required to compare the audited (or current) value of an inventory item with the book (or listed) value. If a company is keeping its inventory and books up to date, there should be a strong linear relationship between the audit values and book values. A company sampled 10 inventory items and obtained the values in the table below.



Item	Audit Value (y_i)	Book Value (x_i)
1	9	10
2	14	12
3	7	9
4	29	27
5	45	47
6	109	112
7	40	36
8	238	241
9	60	59
10	170	167

- (a)  Fit the model $Y = \beta_0 + \beta_1 x + \varepsilon$ to the data.
- (b)  What is your estimate for the expected change in audited value for a one-unit change in book value?
- (c)  If the book value is $x = 100$, what would you use to estimate the audited value?

Question 2

(11.14) J.H. Matis and T.E. Wehrly report the following table of data on the proportion of green sunfish that survive a fixed level of thermal pollution for varying lengths of time.

Proportion of Survivors (y)	Scaled Time (x)
1.00	.10
.95	.15
.95	.20
.90	.25
.85	.30
.70	.35
.65	.40
.60	.45
.55	.50
.40	.55


- (a)  Fit the linear model $Y = \beta_0 + \beta_1 x + \varepsilon$. Give your interpretation.
- (b)  Plot the points and graph the result of part (a). Does the line fit through the points?

Question 3

Suppose that eight specimens of a certain type of alloy were produced at different temperatures, and the durability of each specimen was then observed. The observed values are given in the table below, where

x_i denotes the temperature (in coded units) at which specimen i was produced, and y_i denotes the durability (in coded units) of that specimen.

i	Durability (y_i)	Temperature (x_i)
1	40	0.5
2	41	1.0
3	43	1.5
4	42	2.0
5	44	2.5
6	42	3.0
7	43	3.5
8	42	4.0

- (a) Fit the straight line model $Y = \beta_0 + \beta_1 x + \varepsilon$ using the method of least squares.
- (b) Fit the parabola model $Y = \beta_0 + \beta_1 x + \beta_2 x^2 + \varepsilon$ using the method of least squares.
- (c)  Sketch on the same graph the eight data points and their predicted values according to the two different models.