Practice Problems

Problem 12.9:

Identify the following variables as quantitative or qualitative.

(a) Transect Location (small pasture field, small arable field, or large arable field)
(b) Land use (pasture or arable) adjacent to the transect
(c) Average height of trees in transect
(d) Total number of trees in transect
(e) Height of hedgerow in transect
(f) Width of hedgerow
(g) Width of hedgerow
(h) Width of transect verge
(i) Depth of transect ditch
(j) Width of transect ditch
(k) Length of transect ditch

Problem 12.10:

Data in Table 12.9 comes from students in STA 4163.

Table 12.9

OBS	WEIGHT	HEIGHT
1	140	66.0
2	135	64.0
3	116	63.0
4	150	65.5
5	115	63.5
6	130	63.0
7	200	72.0
8	215	71.0
9	205	70.0
10	99	61.0
11	.	.
12	114	64.0
13	162	65.5
14	110	64.0
15	150	68.0
16	140	69.0
17	145	69.5
18	120	62.0
19	140	66.0

20	145	67.0
21	213	69.0
22	.	.
23	.	.
24	.	.
25	190	71.0
26	.	.
27	108	63.0
28	205	70.0
29	255	72.0
30	160	69.0
31	127	63.0
32	125	66.0
33	125	66.0
34	.	.
35	175	73.0
36	107	62.0
37	110	62.0
38	140	68.0
39	97	65.0
40	.	.
41	130	67.0
42	155	70.0

SAS Printout for First-Order Model:

Model: EQ1
Dependent Variable: WEIGHT

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	34598.60737	34598.60737	73.902	0.0001
Error	33	15449.56406	468.16861		
C Total	34	50048.17143			

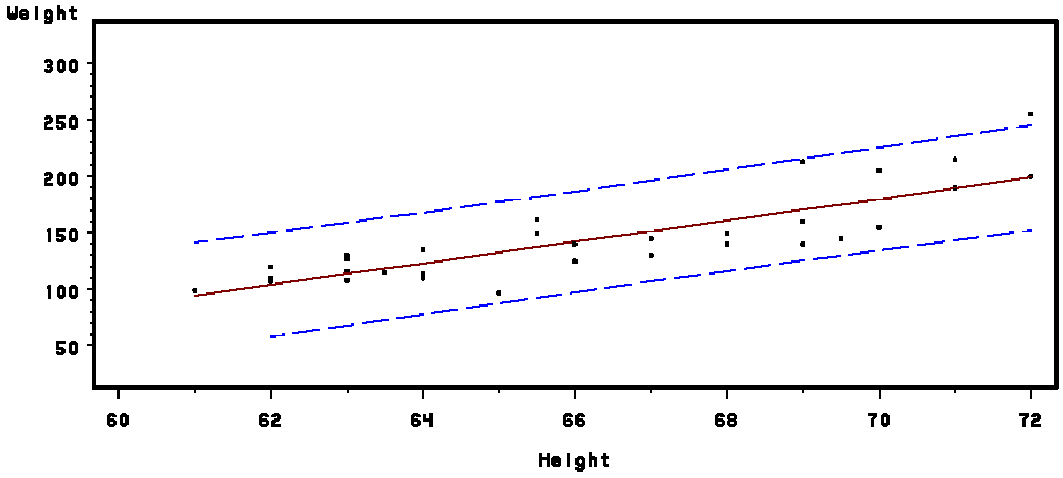
Root MSE	21.63720	R-square	0.6913
Dep Mean	147.22857	Adj R-sq	0.6820
C.V.	14.69634		

Parameter Estimates

Variable	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	-483.387106	73.44727841	-6.581	0.0001
HEIGHT	9.472768	1.10191659	8.597	0.0001

SAS Plot for the 95% confidence interval for the fitted model:

Figure 13.6 95% Confidence Interval for Problem 13.2
(First-Order Model)



SAS Printout for the Second-Order Model:

Model: EQ2
Dependent Variable: WEIGHT
Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	35417.14334	17708.57167	38.731	0.0001
Error	32	14631.02809	457.21963		
C Total	34	50048.17143			

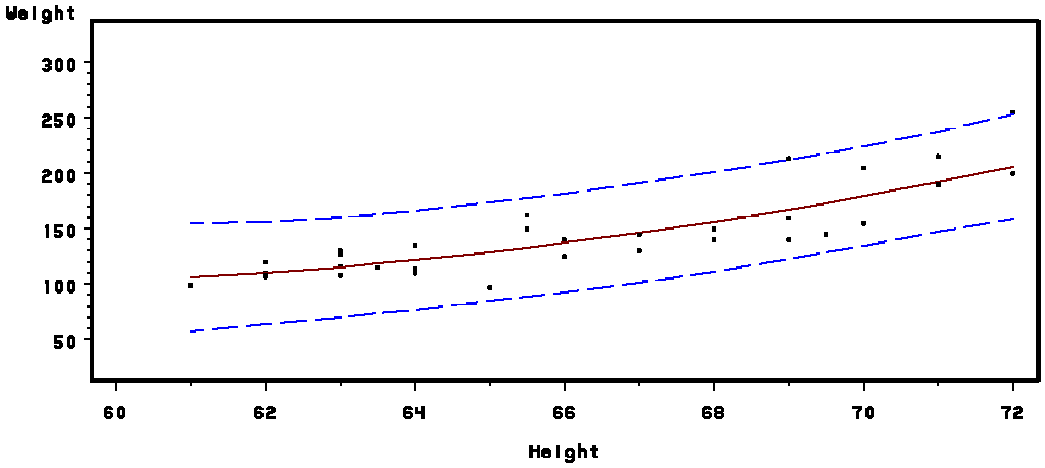
Root MSE	21.38269	R-square	0.7077
Dep Mean	147.22857	Adj R-sq	0.6894
C.V.	14.52347		

Parameter Estimates

Variable	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1646.318085	1593.3607521	1.033	0.3092
HEIGHT	-54.388563	47.74133028	-1.139	0.2631
HEIGHTSQ	0.477548	0.35691123	1.338	0.1903

SAS Plot for the 95% confidence interval for the Second-Order Model:

Figure 13.7 95% Confidence Interval for Problem 13.2
(Second-Order Model)



(a) Write a second order model relating the weight and height of students in STA 4163.

(b) Is there enough evidence to indicate that the first-order model provides enough information for the prediction of the number of annual highway deaths? Is there enough evidence to indicate that the second-order model provides enough information for the prediction of the number of annual highway deaths?

(c) Does the second-order term contribute information for the prediction of highway deaths?