

Example 1 Using Technology to Find the Regression Equation

Refer to the sample data given in Table 10-1 in the Chapter Problem. Use technology to find the equation of the regression line in which the explanatory variable (or x variable) is shoe print length and the response variable (or y variable) is the corresponding height of a person.

Solution

Requirement check (1) The data are assumed to be a simple random sample. (2) Figure 10-1(a) is a scatterplot showing a pattern of points. This pattern is very roughly a straight-line pattern. (3) There are no outliers. The requirements are satisfied. ✓

Using technology: The use of computer software or a calculator is recommended for finding the equation of a regression line. Shown below are the results from STATDISK, Minitab, XLSTAT, the TI-83/84 Plus calculator, SPSS, and JMP. Minitab and XLSTAT provide the actual equation; the other technologies list the values of the y -intercept and the slope. All of these technologies show that the regression equation can be expressed as $\hat{y} = 125 + 1.73x$, where \hat{y} is the predicted height of a person and x is the length of the shoe print.

STATDISK

Regression Results:
Y= b0 + b1x:
Y Intercept, b0: 125.4073
Slope, b1: 1.727452

EXCEL (XLSTAT)

Equation of the model:
Height = 125.40733+1.72745*Shoe Print

MINITAB

Regression Analysis: Height versus Shoe Print
The regression equation is
Height = 125 + 1.73 Shoe Print

TI-83/84 PLUS

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LinRegTTest
Y=a+bx
R≠0 and P≠0
↑a=125.4073302
b=1.72745239
s=4.538762333
↓r²=.3495991312
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SPSS

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	125.407	40.915		3.065	.055
Shoeprint	1.727	1.360	.591	1.270	.294

JMP

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	125.40733	40.91531	3.07	0.0548
Shoeprint	1.7274524	1.360351	1.27	0.2937

We should know that the regression equation is an *estimate* of the true regression equation for the population of paired data. This estimate is based on one particular set of sample data, but another sample drawn from the same population would probably lead to a slightly different equation.

Example 2 Using Manual Calculations to Find the Regression Equation

Refer to the sample data given in Table 10-1 in the Chapter Problem. Use Formulas 10-3 and 10-4 to find the equation of the regression line in which the explanatory variable (or x variable) is the shoe print length and the response variable (or y variable) is the corresponding height of the person.

Solution

Requirement check The requirements are verified in Example 1. ✓

We begin by finding the slope b_1 with Formula 10-3 as follows (with extra digits included for greater accuracy). Remember, r is the linear correlation coefficient,