Homework 5

Simple Linear Regression Analysis

Requirement

- Send soft copies (digital files) to the following email address: 25b358009@stu.hit.edu.cn

- Write your name and student number.

- Submit within a week! Late submission should have a reasonable explanation sent to the TA or lecturer in advance.

- You may discuss with others, but write homework by yourself.

1. Basic concepts

   1.1 What is the least squares regression line, and what are the least squares point estimates?

   1.2 Why is it dangerous to extrapolate outside the experimental region?

   1.3 What are the four regression assumptions?

Methods and Applications

2. **THE DIRECT LABOR COST CASE**

An accountant wishes to predict direct labor cost (y) on the basis of the batch size (x) of a product produced in a job shop. Data for 12 production runs are given in the table.

a Calculate b_0 and b_1. Write the least squares prediction equation.

b Interpret the meanings of b_0 and b_1. Does the interpretation of b_0 make practical sense?

c Use the least squares line to obtain a point estimate of the mean direct labor cost for all batches of size 60 and a point prediction of the direct labor cost for an individual batch of size 60.

d If $n=12$, $b_0 = 18.4875$, $b_1 = 10.1463$, $s= 8.6415$, and $x = 60$, compute 99 percent confidence and prediction intervals for the mean and individual labor costs when x=60.

e calculate the simple correlation coefficient.

Direct Labor Cost
Data   DS DirLab

Direct Labor Cost, y ($100s)	Batch Size, x
71	5
663	62
381	35
138	12
861	83
145	14
493	46
548	52
251	23
1024	100
435	41
772	75