

(c) Is the bivariate normal distribution a viable population model? Explain with reference to Q - Q plots and a scatter diagram.

- 5.20. A wildlife ecologist measured x_1 = tail length (in millimeters) and x_2 = wing length (in millimeters) for a sample of $n = 45$ female hook-billed kites. These data are displayed in Table 5.12. Using the data in the table,

Table 5.12 Bird Data

x_1 (Tail length)	x_2 (Wing length)	x_1 (Tail length)	x_2 (Wing length)	x_1 (Tail length)	x_2 (Wing length)
191	284	186	266	173	271
197	285	197	285	194	280
208	288	201	295	198	300
180	273	190	282	180	272
180	275	209	305	190	292
188	280	187	285	191	286
210	283	207	297	196	285
196	288	178	268	207	286
191	271	202	271	209	303
179	257	205	285	179	261
208	289	190	280	186	262
202	285	189	277	174	245
200	272	211	310	181	250
192	282	216	305	189	262
199	280	189	274	188	258

Source: Data courtesy of S. Temple.

- (a) Find and sketch the 95% confidence ellipse for the population means μ_1 and μ_2 . Suppose it is known that $\mu_1 = 190$ mm and $\mu_2 = 275$ mm for *male* hook-billed kites. Are these plausible values for the mean tail length and mean wing length for the female birds? Explain.
- (b) Construct the simultaneous 95% T^2 -intervals for μ_1 and μ_2 and the 95% Bonferroni intervals for μ_1 and μ_2 . Compare the two sets of intervals. What advantage, if any, do the T^2 -intervals have over the Bonferroni intervals?
- (c) Is the bivariate normal distribution a viable population model? Explain with reference to Q - Q plots and a scatter diagram.
- 5.21. Using the data on bone mineral content in Table 1.8, construct the 95% Bonferroni intervals for the individual means. Also, find the 95% simultaneous T^2 -intervals. Compare the two sets of intervals.
- 5.22. A portion of the data contained in Table 6.10 in Chapter 6 is reproduced in Table 5.13. These data represent various costs associated with transporting milk from farms to dairy plants for gasoline trucks. Only the first 25 multivariate observations for gasoline trucks are given. Observations 9 and 21 have been identified as outliers from the full data set of 36 observations. (See [2].)