SAS Code for Unit 7 Examples

Example 1: Distinguishing between the Rocky Mountain Wolf and the Arctic Wolf

Are the means of the nine morphometric variables below different for two species of wolves when sex of the wolf is taken into account?

/\* ---------------------------------------------------------

\* Skull morphometric data on Rocky Mountain and Arctic

\* wolves (Canis Lupus L.) taken from Morrison (1990),

\* 3rd edition, p. 288-289, which were taken from

\* taken from Jolicoeur (1959, 1975).

\*

\* Variables are:

\* Location: rm=rocky mountain ar=arctic

\* Sex: m=male f=female

\* X1 = palatal length

\* X2 = postpalatal length

\* X3 = zygomatic width

\* X4 = palatal width outside the first upper molars

\* X5 = palatal width inside the second upper molars

\* X6 = width between the postglenoid foramina

\* X7 = interorbital width

\* X8 = least width of the braincase

\* X9 = crown length of the first upper molar

\*

\* Data useful for cluster analysis, discriminant analysis,

\* and MANOVA

\* ----------------------------------------------------------- \*/

**DATA** wolves;

LENGTH location $**2** wolf $**5** sex $**1**;

INPUT location $ wolf $ sex $ x1-x9;

subject=\_n\_;

LABEL

X1 = 'palatal length'

X2 = 'postpalatal length'

X3 = 'zygomatic width'

X4 = 'palatal width-1'

X5 = 'palatal width-2'

X6 = 'postg foramina width'

X7 = 'interorbital width'

X8 = 'braincase width'

X9 = 'crown length';

cards;

rm rmm1 m 126 104 141 81.0 31.8 65.7 50.9 44.0 18.2

rm rmm2 m 128 111 151 80.4 33.8 69.8 52.7 43.2 18.5

rm rmm3 m 126 108 152 85.7 34.7 69.1 49.3 45.6 17.9

rm rmm4 m 125 109 141 83.1 34.0 68.0 48.2 43.8 18.4

rm rmm5 m 126 107 143 81.9 34.0 66.1 49.0 42.4 17.9

rm rmm6 m 128 110 143 80.6 33.0 65.0 46.4 40.2 18.2

rm rmf1 f 116 102 131 76.7 31.5 65.0 45.4 39.0 16.8

rm rmf2 f 120 103 130 75.1 30.2 63.8 44.4 41.1 16.9

rm rmf3 f 116 103 125 74.7 31.6 62.4 41.3 44.2 17.0

ar arm1 m 117 99 134 83.4 34.8 68.0 40.7 37.1 17.2

ar arm2 m 115 100 149 81.0 33.1 66.7 47.2 40.5 17.7

ar arm3 m 117 106 142 82.0 32.6 66.0 44.9 38.2 18.2

ar arm4 m 117 101 144 82.4 32.8 67.5 45.3 41.5 19.0

ar arm5 m 117 103 149 82.8 35.1 70.3 48.3 43.7 17.8

ar arm6 m 119 101 143 81.5 34.1 69.1 50.1 41.1 18.7

ar arm7 m 115 102 146 81.4 33.7 66.4 47.7 42.0 18.2

ar arm8 m 117 100 144 81.3 37.2 66.8 41.4 37.6 17.7

ar arm9 m 114 102 141 84.1 31.8 67.8 47.8 37.8 17.2

ar arm10 m 110 94 132 76.9 30.1 62.1 42.0 40.4 18.1

ar arf1 f 112 94 134 79.5 32.1 63.3 44.9 42.7 17.7

ar arf2 f 109 91 133 77.9 30.6 61.9 45.2 41.2 17.1

ar arf3 f 112 99 139 77.2 32.7 67.4 46.9 40.9 18.3

ar arf4 f 112 99 133 78.5 32.5 65.5 44.2 34.1 17.5

ar arf5 f 113 97 146 84.2 35.4 68.7 51.0 43.6 17.2

ar arf6 f 107 97 137 78.1 30.7 61.6 44.9 37.3 16.5

;

**RUN**;

Example 2: Distinguishing between Schizophrenic and Non-Schizophrenic Individuals

Are the means of the six tests different for individuals with schizophrenia and without schizophrenia?

**proc** **format**;

value schiz **0**='Normal'

**1**='Schizophrenic';

**run**;

**data** discrim;

input schizo test1-test6 @@;

format schizo schiz.;

DATALINES;

1 45 54 50 53 28 44 1 33 38 55 58 31 37 1 47 45 45 50 27 30

1 55 33 43 49 47 45 0 62 50 64 61 65 61 0 53 49 58 52 71 56

1 56 61 57 45 75 63 1 48 43 52 57 54 50 0 59 47 48 47 61 51

1 26 46 31 37 28 42 0 53 50 47 30 56 48 0 52 74 71 62 53 57

0 61 48 53 54 55 52 0 54 57 60 73 42 60 1 55 43 56 48 54 46

0 58 57 40 52 54 69 1 28 58 38 49 39 45 0 58 57 58 50 61 70

0 62 49 80 68 66 51 1 53 44 45 37 40 53 1 52 54 51 67 35 46

0 62 39 50 40 53 51 1 44 42 44 50 36 35 0 64 54 48 46 66 63

1 59 57 41 56 43 51 1 48 65 47 62 45 55 0 56 45 40 35 59 51

0 58 69 74 71 69 65 0 57 52 50 46 50 61 1 41 57 38 46 41 40

1 34 43 38 42 30 44 1 38 44 56 46 57 41 0 43 54 44 35 54 50

1 59 66 61 53 62 60 0 65 54 49 38 57 52 1 46 40 43 60 41 39

0 57 64 52 64 57 63 0 51 40 63 58 42 48 1 45 43 38 42 44 50

1 45 50 62 61 45 50 0 56 73 39 37 63 48 0 64 70 47 54 67 59

1 46 42 55 50 39 33 0 61 53 55 58 69 65 0 62 61 53 51 66 56

1 35 44 58 53 50 44 0 48 60 50 53 58 44 0 52 32 34 37 40 52

1 42 43 34 40 39 27 1 36 49 58 53 38 35 0 44 64 48 45 34 48

1 42 52 41 41 50 49 1 56 46 52 64 45 47 1 41 39 40 44 38 35

0 62 63 58 56 70 63 0 49 73 45 39 55 41 1 50 50 48 54 40 49

1 42 49 49 53 41 51 0 41 49 72 63 43 43 0 52 46 49 41 53 36

0 72 60 61 52 55 60 1 26 46 44 42 45 43 0 61 56 65 61 77 63

0 51 47 60 59 48 51 0 50 40 48 40 47 42 0 64 60 65 60 62 68

1 57 50 47 37 51 59 1 38 47 44 33 48 52 0 66 38 61 60 62 50

1 43 37 37 44 43 50 1 45 61 56 54 59 54 1 50 37 49 42 52 48

0 45 40 52 45 56 59 0 68 66 82 78 67 64 0 59 53 62 51 57 68

1 52 54 38 38 50 52 0 50 46 69 62 53 60 1 41 50 34 37 50 44

1 33 33 58 51 46 44 0 52 67 66 64 65 59 0 61 69 65 76 68 88

1 33 46 24 22 38 31 1 37 42 39 39 41 29 1 36 26 60 55 67 37

1 39 36 53 56 37 36 1 51 32 52 49 48 32 0 64 77 70 78 67 58

0 54 49 61 59 52 57 0 48 66 66 66 60 43 1 40 67 43 52 45 65

1 43 46 54 41 50 38 1 53 53 52 56 52 63 1 38 38 42 46 52 55

1 34 58 43 48 52 46 0 52 42 64 62 59 55 0 40 37 41 37 42 30

1 46 35 47 48 42 34 0 50 52 51 47 54 54 0 58 54 39 45 50 56

0 50 63 49 53 54 40

;

**run**;

Example 3: Ancient Pottery

Can we use the five elements measured from four different sites to determine whether a pottery shard belongs to a certain site?

**data** pottery;

input Al Fe Mg Ca Na Site $ @@;

datalines;

14.4 7.00 4.30 0.15 0.51 L 13.8 7.08 3.43 0.12 0.17 L

14.6 7.09 3.88 0.13 0.20 L 11.5 6.37 5.64 0.16 0.14 L

13.8 7.06 5.34 0.20 0.20 L 10.9 6.26 3.47 0.17 0.22 L

10.1 4.26 4.26 0.20 0.18 L 11.6 5.78 5.91 0.18 0.16 L

11.1 5.49 4.52 0.29 0.30 L 13.4 6.92 7.23 0.28 0.20 L

12.4 6.13 5.69 0.22 0.54 L 13.1 6.64 5.51 0.31 0.24 L

12.7 6.69 4.45 0.20 0.22 L 12.5 6.44 3.94 0.22 0.23 L

11.8 5.44 3.94 0.30 0.04 C 11.6 5.39 3.77 0.29 0.06 C

18.3 1.28 0.67 0.03 0.03 I 15.8 2.39 0.63 0.01 0.04 I

18.0 1.50 0.67 0.01 0.06 I 18.0 1.88 0.68 0.01 0.04 I

20.8 1.51 0.72 0.07 0.10 I 17.7 1.12 0.56 0.06 0.06 A

18.3 1.14 0.67 0.06 0.05 A 16.7 0.92 0.53 0.01 0.05 A

14.8 2.74 0.67 0.03 0.05 A 19.1 1.64 0.60 0.10 0.03 A

;

**run**;