**APPENDIX-XX**

**NOTE ON PROCEDURE OF CALCULATION OF COEFFICIENTS BY AITKEN'S PIVOTAL CONDENSATION METHOD**

The following are the procedures for calculating the Regression Coefficients by the Aitken's Pivotal Condensation Method.

**STEPS IN CALCULATING REGRESSION COEFFICIENTS:**

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(a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) |
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FIRST CONDENSATION STARTING WITH ONE

(i) Tetrad between First and second line.

\[
\begin{align*}
1 \times 1 & - .42 \times .42 = .823 \\
1 \times .50 & - .42 \times .41 = .327 \\
1 \times .30 & - .42 \times .32 = .165 \\
1 \times 0 & - (-1) \times .42 = .42 \\
1 \times (-1) & -0 \times .42 = -1 \\
1 \times 0 & -0 \times .42 = 0 \\
1 \times 0 & -0 \times .42 = 0
\end{align*}
\]

(ii) Tetrad between first and third line.

\[
\begin{align*}
1 \times .50 & - .41 \times .42 = .327 \\
1 \times 1 & - .41 \times .41 = .831 \\
1 \times .40 & - .41 \times .32 = .268 \\
1 \times 0 & - .41 (-1) = .41 \\
1 \times 0 & - .41 \times 0 = 0 \\
1 \times (-1) & - .41 \times 0 = -1 \\
1 \times 0 & -0 \times .41 = 0
\end{align*}
\]

(iii) Tetrad between first and fourth line.

\[
\begin{align*}
1 \times .30 & - .32 \times .42 = .165 \\
1 \times .40 & - .32 \times .41 = .268 \\
1 \times .1 & - .32 \times .32 = .897 \\
1 \times 0 & - .32 \times -1 = .32 \\
1 \times 0 & - .32 \times 0 = 0 \\
1 \times 0 & -0 \times .32 = 0 \\
1 \times -1 & - .32 \times 0 = -1
\end{align*}
\]
(iv) Tetrad between first and fifth line.

\[
\begin{align*}
1 \times .43 - .68 \times .42 &= .144 \\
1 \times .32 - .41 \times .68 &= .041 \\
1 \times .46 - .32 \times .68 &= .242 \\
1 \times 0 - (-1) \times .68 &= .68 \\
1 \times 0 - 0 \times .68 &= 0 \\
1 \times 0 - 0 \times .68 &= 0 \\
1 \times 0 - 0 \times .68 &= 0
\end{align*}
\]

SECOND CONDENSATION STARTING WITH ONE

(v) Tetrad between first and second line.

\[
\begin{align*}
1 \times .831 - .327 \times .397 &= .701 \\
1 \times .268 - .327 \times .200 &= .202 \\
1 \times .410 - .327 \times .510 &= .243 \\
1 \times 0 - .327 \times (-1.215) &= .397 \\
1 \times (-1) - .327 \times 0 &= -1 \\
1 \times 0 - .327 \times 0 &= 0
\end{align*}
\]

(vi) Tetrad between first and third line

\[
\begin{align*}
1 \times .268 - .165 \times .397 &= .202 \\
1 \times .897 - .165 \times .200 &= .864 \\
1 \times .320 - .165 \times .510 &= .235 \\
1 \times 0 - .165 \times (-1.215) &= .200 \\
1 \times 0 - .165 \times 0 &= 0 \\
1 \times (-1) - .165 \times 0 &= -1
\end{align*}
\]
(vii) Tetrad between first and fourth line.

\[
\begin{align*}
1 \times .041 - .144 \times .397 &= -.016 \\
1 \times .242 - .144 \times .200 &= .213 \\
1 \times .680 - .144 \times .510 &= .606 \\
1 \times 0 - .144 \times (-1.215) &= .174 \\
1 \times 0 - .144 \times 0 &= 0 \\
1 \times 0 - .144 \times 0 &= 0
\end{align*}
\]

THIRD CONDENSATION STARTING WITH ONE

(viii) Tetrad between first and second line.

\[
\begin{align*}
1 \times .864 - .202 \times .288 &= .805 \\
1 \times .235 - .202 \times .346 &= .165 \\
1 \times .200 - .202 \times .566 &= .085 \\
1 \times 0 - .202 \times (-1.426) &= .288 \\
1 \times (-1) - .202 \times 0 &= -1
\end{align*}
\]

(ix) Tetrad between first and third line.

\[
\begin{align*}
1 \times .213 - (-.016) \times .288 &= .217 \\
1 \times .606 - (-.016) \times .346 &= .611 \\
1 \times .174 - (-.016) \times .566 &= .183 \\
1 \times 0 - (-.016) \times (-1.426) &= 0 \\
1 \times 0 - (-.016) \times 0 &= 0
\end{align*}
\]

(x) Tetrad between first and fourth line.

\[
\begin{align*}
1 \times .611 - .217 \times .204 &= .566 \\
1 \times .183 - .217 \times .105 &= .160
\end{align*}
\]
\[
1 \times (-.022) \times .217 \times .357 = -.099 \\
1 \times 0 \times -.217 \times (-1.242) = .269
\]

**CHECK:**

(i) \[1 \times 1.22 \times -.42 \times 1.15 = .73\]
(ii) \[1 \times 1.31 \times -.41 \times 1.15 = .83\]
(iii) \[1 \times 1.02 \times -1.15 \times .32 = .65\]
(iv) \[1 \times 1.89 \times -.68 \times 1.15 = 1.11\]
(v) \[1 \times .83 \times -.327 \times .89 = .54\]
(vi) \[1 \times .65 \times -.165 \times .89 = .50\]
(vii) \[1 \times 1.10 \times -.144 \times .89 = .98\]
(viii) \[1 \times .98 \times (-.016) \times .77 = .99\]
(ix) \[1 \times .99 \times .217 \times .42 = .89\]

**Steps in Calculating Pooling Square:**

Regression coefficients which have been calculated by
the help of Atkin's Pivotal Condensation Method is placed ver-
tically and horizontally above their respective tests and the
values of intercorrelations of the tests were put in the pool-
ing square, as shown below. A, B and C is calculated in this
problem to find out multiple correlation.
<table>
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<tr>
<th>A</th>
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<td>.42</td>
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<td>.32</td>
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<td>.42</td>
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<td>.50</td>
<td>.30</td>
</tr>
<tr>
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<td>.42</td>
<td>1</td>
<td>.50</td>
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<td>.30</td>
<td>.40</td>
<td>1</td>
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</tr>
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</table>

\[
\begin{align*}
.566 \times .68 &= .3848 \\
.160 \times .43 &= .0688 \\
-.099 \times .32 &= -.0316 \\
.269 \times .46 &= .1237 \\
.41 \times .566 &= .2320 \\
.50 \times .160 &= .0800 \\
1 \times -.099 &= -.099 \\
.40 \times .269 &= .1076 \\
\end{align*}
\]

\[
\begin{align*}
1 \times .566 &= .5660 \\
.42 \times .566 &= .2377 \\
.42 \times .160 &= .0672 \\
1 \times .160 &= .1600 \\
.41 \times -.099 &= -.0405 \\
.50 \times -.099 &= -.0495 \\
.32 \times .269 &= .0860 \\
.30 \times .269 &= .0807 \\
.32 \times .566 &= .1811 \\
.30 \times .160 &= .0480 \\
.40 \times -.099 &= -.0396 \\
1 \times .269 &= .2690 \\
\end{align*}
\]
The pooling square thus condenses to

\[
\begin{array}{c|cc}
1.0000 & .5457 \\
.5457 & .5457 \\
\end{array}
\]

\[R_{1(2345)} = \frac{.5457}{\sqrt{.5457}} = .74\]

Alternatively, the pooling square can also be estimated as -

\[A = 1\]
\[B = (.566)^2 + (.160)^2 + (-.099)^2 + (.269)^2 + 2 \times (.42) \times (.566) \times (.160) + 2 \times (.32) \times (.269) \times (.566) + 2 \times (.30) \times (.269) \times (-.099) + 2 \times (.32) \times (-.099) \times (.566) + 2 \times (.30) \times (.269) \times (.160) + 2 \times (.40) \times (.269) \times (-.099)\]

\[= .5457\]

\[C = (.566) \times .68 + (.160) \times (.43) + (-.099) \times (.32) + (.269) \times (.46)\]

\[= .5457\]

The pooling square thus condenses to

\[
\begin{array}{c|cc}
1(\alpha) & .5457(\alpha) \\
& .5457(B) \end{array}
\]

Here, \(B = C\), because regression coefficients have been used as weights, then -

\[R_{1(2345)} = \sqrt{C} = \sqrt{.5457} = .74\]