APPENDIX 2.1

Let

\[ w = m, \text{ for a SRGD design,} \]
\[ = n, \text{ for a triangular design,} \]
\[ = 2s - 1, \text{ for a } L_2 \text{ design,} \]
\[ = v - p, \text{ for a rectangular design.} \]

It is now required to show that for the four classes of designs mentioned above

\[(v-k)(b-r) - (v-rk)(v-w) > 0.\]

Proof. Let \( Q = (v-k)(b-r) - (v-rk)(v-w). \)

Now,

\[ Q = \frac{[(v-k)(b-r)(b-1) - (v-rk)(v-w)(b-1)]}{(b-1)} \]
\[ = \frac{[(v-k)(b-r)(b-v+w-1) + (v-k)(b-r)(v-w) - (v-rk)(v-w)(b-1)]}{(b-1)} \]
\[ = \frac{[(v-k)(b-r)(b-v+w-1) + v(v-w)(r-1)^2]}{(b-1)}. \]
Hence, if $b \geq v - w + 1$, then $Q > 0$. Now, for the four classes of designs mentioned above, $b \geq v - w + 1$. Hence $Q > 0$ for the four classes of designs mentioned above.