

APPENDIX 2 (a)

Showing computations for r and t of Q-S for total sample (N 100)
B₁ - N

$$\begin{aligned}
 r_{XY} &= \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\
 &= \frac{100(306140) - (-905)(-1075)}{\sqrt{[100(491669) - (-905)^2][100(626495) - (-1075)^2]}} \\
 &= \frac{29641125}{4855229625} \\
 &= 0.061
 \end{aligned}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\
 &= \frac{(-9.05) - (-1.07)}{\sqrt{48.3478 + 61.493875 - 2(0.61)(6.9534)(7.8418)}} \\
 &= \frac{7.98}{\sqrt{103.249}} \\
 &= \frac{7.98}{10.159} \\
 &= .786
 \end{aligned}$$

$$\underline{\underline{B_2 - S}}$$

$$\begin{aligned} r_{XY} &= \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\ &= \frac{100(115882) - (215)(747)}{\sqrt{100(167249) - (215)^2 \quad 100(181621) - (747)^2}} \\ &= \frac{14427595}{17132357.76} \\ &= 0.067 \end{aligned}$$

$$\begin{aligned} t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\ &= \frac{(2.15) - (7.47)}{\sqrt{16.678 + 17.604091 - 2(0.067)(4.0841)(4.195)}} \\ &= \frac{5.32}{\sqrt{31.991}} \\ &= \frac{5.32}{5.6561} \\ &= .94 \end{aligned}$$

$$\underline{B_3 - I}$$

$$\begin{aligned} r_{XY} &= \frac{[N \Sigma XY - (\Sigma X)(\Sigma Y)]}{\sqrt{[N \Sigma X^2 - (\Sigma X)^2][N \Sigma Y^2 - (\Sigma Y)^2]}} \\ &= \frac{100(82701) - (-165)(-708)}{\sqrt{[100(158257) - (165)^2][100(207604) - (-708)^2]}} \\ &= \frac{8153280}{17898706.62} \\ &= 0.455 \end{aligned}$$

$$\begin{aligned} t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\ &= \frac{(-1.65) - (-7.08)}{\sqrt{15.7985 + 20.2591 - 2(0.455)(3.9749)(4.4999)}} \\ &= \frac{5.43}{\sqrt{19.7807}} \\ &= \frac{5.43}{4.4476} \\ &= 1.221 \end{aligned}$$

$$\underline{B_4 - D}$$

$$\begin{aligned} r_{XY} &= \frac{[N\Sigma XY - (\Sigma X)(\Sigma Y)]}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\ &= \frac{100(264377) - (2849)(2780)}{\sqrt{[100(357993) - (2849)^2][100(402594) - (2780)^2]}} \\ &= \frac{18517480}{30007780.32} \\ &= 0.617 \end{aligned}$$

$$\begin{aligned} t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\ &= \frac{(28.49) - (27.80)}{\sqrt{27.6825 + 32.531 - 2(0.617)(5.2594)(5.7035)}} \\ &= \frac{0.69}{\sqrt{23.1972}} \\ &= \frac{0.69}{4.8166} \\ &= 0.143 \end{aligned}$$

$$\underline{F_1 - C}$$

$$\begin{aligned}
 r_{XY} &= \frac{[N\Sigma XY - (\Sigma X)(\Sigma Y)]}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{100(437156) - (2700)(2549)}{\sqrt{[100(619292) - (2700)^2][100(683160) - (2549)^2]}} \\
 &= \frac{36833300}{58115904} \\
 &= 0.6337
 \end{aligned}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\
 &= \frac{(27.00) - (25.49)}{\sqrt{54.6392 + 61.8186 - 2(0.6337)(7.3919)(7.8362)}} \\
 &= \frac{1.51}{\sqrt{42.7914}} \\
 &= \frac{1.51}{6.5422} \\
 &= 0.231
 \end{aligned}$$

$$\underline{F_2 = S}$$

$$\begin{aligned} r_{XY} &= \frac{[N\Sigma XY - (\Sigma X)(\Sigma Y)]}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\ &= \frac{100(85798) - (929)(-260)}{\sqrt{[100(369045) - (929)^2][100(429408) - (-260)^2]}} \\ &= \frac{8921340}{39307861.84} \\ &= 0.2269 \end{aligned}$$

$$\begin{aligned} t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\ &= \frac{(9.29) - (-260)}{\sqrt{36.0415 + 42.8732 - 2(0.2269)(6.0033)(6.5476)}} \\ &= \frac{11.89}{\sqrt{61.0825}} \\ &= \frac{11.89}{7.8154} \\ &= 1.521 \end{aligned}$$

APPENDIX 2 (b)

Showing computations for r and t of Q-S form for boys (N 53)
B₁ - N

$$\begin{aligned}
 r_{XY} &= \frac{[N\Sigma XY - (\Sigma X)(\Sigma Y)]}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{53(120578) - (-1435)(-1905)}{\sqrt{[53(260319 - (-1435)^2)][53(375205 - (-1905)^2)]}} \\
 &= \frac{3656959}{13813675} \\
 &= .26
 \end{aligned}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma M_1^2 + \sigma M_2^2 - 2r\sigma M_1\sigma M_2}} \\
 &= \frac{(-27.07) - (-35.94)}{\sqrt{(8.88)^2 + (10.45)^2 - 2(.26)(8.88)(10.45)}} \\
 &= \frac{8.87}{\sqrt{139.7841}} \\
 &= \frac{8.87}{11.82} \\
 &= 0.75
 \end{aligned}$$

$$\underline{B_2 - S}$$

$$\begin{aligned}
 r_{XY} &= \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\
 &= \frac{53(67863) - (435)(1123)}{\sqrt{[53(84647) - (435)^2][53(111001) - (1123)^2]}} \\
 &= \frac{3108234}{4489189.02} \\
 &= .69
 \end{aligned}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\
 &= \frac{(8.20) - (21.18)}{\sqrt{29.2877 + 31.0453 - 2(.69)(5.41)(5.57)}} \\
 &= \frac{12.98}{\sqrt{18.7485}} \\
 &= \frac{12.98}{4.30} \\
 &= 3.02
 \end{aligned}$$

$$\underline{B_3 - I}$$

$$\begin{aligned}
 r_{XY} &= \frac{[N\Sigma XY - (\Sigma X)(\Sigma Y)]}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{53(38738) - (-443)(-1171)}{\sqrt{[53(77879) - (-443)^2][53(110195) - (-1171)^2]}} \\
 &= \frac{1534361}{4191601.01} \\
 &= .37
 \end{aligned}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\
 &= \frac{(-8.35) - (-22.09)}{\sqrt{24.4066 + 30.0187 - 2(.37)(5.14)(5.48)}} \\
 &= \frac{13.74}{\sqrt{35.5816}} \\
 &= \frac{13.77}{5.96} \\
 &= 2.31
 \end{aligned}$$

$$\underline{B_4 - D}$$

$$\begin{aligned}
 r_{XY} &= \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\
 &= \frac{53(178769) - (2161)(2533)}{\sqrt{[53(224931) - (2161)^2][53(273855) - (2533)^2]}} \\
 &= \frac{4000944}{7660773} \\
 &= .52
 \end{aligned}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\
 &= \frac{(40.77) - (47.79)}{\sqrt{48.7075 + 54.3954 - 2(.52)(6.98)(7.38)}} \\
 &= \frac{7.02}{\sqrt{49.5300}} \\
 &= \frac{7.02}{7.04} \\
 &= 0.997
 \end{aligned}$$

$$\underline{F_1 - C}$$

$$\begin{aligned}
 r_{XY} &= \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\
 &= \frac{53(185108) - (615)(-77)}{\sqrt{[53(267307) - (615)^2][53(329985) - (-77)^2]}} \\
 &= \frac{9858079}{246293058918046} \\
 &= .62
 \end{aligned}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\
 &= \frac{(11.60) - (-1.45)}{\sqrt{92.6204 + 119.9749 - 2(.62)(9.62)(10.95)}} \\
 &= \frac{13.05}{\sqrt{81.9749}} \\
 &= \frac{13.05}{9.05} \\
 &= 1.44
 \end{aligned}$$

$$\underline{F_2 - S}$$

$$\begin{aligned} r_{XY} &= \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\ &= \frac{53(18624) - (-97)(-654)}{\sqrt{[53(137263) - (-97)^2][53(214828) - (-654)^2]}} \\ &= \frac{923634}{89.23828} \\ &= .10 \end{aligned}$$

$$\begin{aligned} t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\ &= \frac{(-1.80) - (-12.33)}{\sqrt{48.8055 + 73.6105 - 2(.10)(6.99)(8.58)}} \\ &= \frac{10.53}{\sqrt{110.4212}} \\ &= \frac{10.53}{10.51} \\ &= 1.002 \end{aligned}$$

APPENDIX 2 (c)

Showing computations for r and t of Q-S form for girls (N 47)
 B: B₁ - N

$$\begin{aligned}
 r_{XY} &= \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\
 &= \frac{47(185562) - (530)(830)}{\sqrt{[47(231350) - (550)^2][47(251290) - (830)^2]}} \\
 &= \frac{8281514}{10842846.6} \\
 &= .76
 \end{aligned}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\
 &= \frac{(11.28) - (17.65)}{\sqrt{101.8170 + 107.1220 - 2(.76)(10.09)(10.35)}} \\
 &= \frac{6.37}{\sqrt{50.5099}} \\
 &= \frac{6.37}{7.11} \\
 &= 0.90
 \end{aligned}$$

$$\underline{B_2 - S}$$

$$\begin{aligned} r_{XY} &= \frac{[N \sum XY - (\sum X)(\sum Y)]}{\sqrt{[N \sum X^2 - (\sum X)^2][N \sum Y^2 - (\sum Y)^2]}} \\ &= \frac{47(48019) - (-220)(-376)}{\sqrt{[47(82602) - (-220)^2][47(70620) - (-376)^2]}} \\ &= \frac{2174173}{3490445.58} \\ &= .62 \end{aligned}$$

$$\begin{aligned} t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\ &= \frac{(-4.68) - (-7.52)}{\sqrt{36.9272 + 30.6075 - 2(.62)(6.08)(5.53)}} \\ &= \frac{2.84}{\sqrt{25.8429}} \\ &= \frac{2.84}{5.08} \\ &= 0.56 \end{aligned}$$

$$\underline{B_3 - I}$$

$$\begin{aligned} r_{XY} &= \frac{[N\Sigma XY - (\Sigma X)(\Sigma Y)]}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\ &= \frac{47(43963) - (278)(463)}{\sqrt{[47(80378) - (278)^2][47(97409) - (463)^2]}} \\ &= \frac{1932547}{4018502.60} \\ &= .48 \end{aligned}$$

$$\begin{aligned} t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\ &= \frac{(5.90) - (9.35)}{\sqrt{35.6422 + 42.0317 - 2(.48)(5.97)(6.48)}} \\ &= \frac{3.95}{\sqrt{40.5357}} \\ &= \frac{3.95}{6.37} \\ &= .78 \end{aligned}$$

$$\underline{B_4 - D}$$

$$\begin{aligned} r_{XY} &= \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\ &= \frac{47(85608) - (688)(247)}{\sqrt{[47(133062) - (688)^2][47(128739) - (247)^2]}} \\ &= \frac{3853640}{5884217.78} \\ &= .65 \end{aligned}$$

$$\begin{aligned} t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\ &= \frac{(14.63) - (5.251)}{\sqrt{55.6772 + 57.6917 - 2(.65)(7.46)(7.60)}} \\ &= \frac{9.38}{\sqrt{39.6641}} \\ &= \frac{9.38}{6.30} \\ &= 1.49 \end{aligned}$$

$$\underline{F_1 - C}$$

$$\begin{aligned} r_{XY} &= \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\ &= \frac{47(252048) - (2085)(2626)}{\sqrt{[47(348985) - (2085)^2][47(353175) - (2626)^2]}} \\ &= \frac{6371046}{10815478} \\ &= .59 \end{aligned}$$

$$\begin{aligned} t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\ &= \frac{(44.36) - (55.87)}{\sqrt{116.1117 + 93.4605 - 2(.59)(10.78)(9.67)}} \\ &= \frac{11.51}{\sqrt{86.5659}} \\ &= \frac{11.51}{9.80} \\ &= 1.24 \end{aligned}$$

$$\underline{F_2 - S}$$

$$\begin{aligned}
 r_{XY} &= \frac{[N\sum XY - (\sum X)(\sum Y)]}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\
 &= \frac{47(77174) - (1026)(394)}{\sqrt{[47(231782) - (1026)^2][47(214580) - (394)^2]}} \\
 &= \frac{3222934}{9885451} \\
 &= .33
 \end{aligned}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}} \\
 &= \frac{(21.82) - (8.39)}{\sqrt{94.7871 + 95.6438 - 2(.33)(9.73)(9.78)}} \\
 &= \frac{13.43}{\sqrt{127.6257}} \\
 &= \frac{13.43}{11.30} \\
 &= 1.19
 \end{aligned}$$

APPENDIX 2 (d)

Showing computations for t of sex difference on 'Question' form
 Boys : 53
 Girls: 47

B₁ - N

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\
 &= \frac{(-27.07) - (11.28)}{\sqrt{78.8415 + 101.8170}} \\
 &= \frac{38.35}{\sqrt{180.6585}} \\
 &= \frac{38.35}{13.44} \\
 &= 2.853
 \end{aligned}$$

B₂ - S

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\
 &= \frac{(8.20) - (-4.68)}{\sqrt{29.2877 + 36.9272}} \\
 &= \frac{12.88}{\sqrt{66.2149}} \\
 &= \frac{12.58}{8.137} \\
 &= 1.582
 \end{aligned}$$

$$\underline{B_3 - I}$$

$$\begin{aligned} t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\ &= \frac{(-8.35) - (5.90)}{\sqrt{26.4066 + 35.6422}} \\ &= \frac{14.20}{\sqrt{62.0488}} \\ &= \frac{14.20}{7.881} \\ &= 1.80 \end{aligned}$$

$$\begin{aligned} \underline{B_4 - D} \\ t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\ &= \frac{(40.77) - (14.63)}{\sqrt{48.7075 + 55.6772}} \\ &= \frac{26.14}{\sqrt{104.3847}} \\ &= \frac{26.14}{10.216} \\ &= 2.558 \end{aligned}$$

$$\begin{aligned}
 & \underline{F_1 - C} \\
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\
 &= \frac{(11.6) - (44.36)}{\sqrt{92.6204 + 116.117}} \\
 &= \frac{32.76}{\sqrt{208.7374}} \\
 &= \frac{32.76}{14.447} \\
 &= 2.267
 \end{aligned}$$

$$\begin{aligned}
 & \underline{F_2 - S} \\
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\
 &= \frac{(-1.80) - (21.82)}{\sqrt{48.8055 + 94.7871}} \\
 &= \frac{23.62}{\sqrt{143.5926}} \\
 &= \frac{23.62}{11.983} \\
 &= 1.971
 \end{aligned}$$

APPENDIX 2 (e)

Showing computation for t of sex difference on 'Statement' form

Boys : 53

Girls: 47

B₁ - N

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\
 &= \frac{(-35.94) - (17.65)}{\sqrt{109.1965 + 107.1220}} \\
 &= \frac{53.59}{\sqrt{216.3185}} \\
 &= \frac{53.59}{14.709} \\
 &= 3.643
 \end{aligned}$$

B₂ - S

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\
 &= \frac{(21.18) - (-7.52)}{\sqrt{31.0453 + 30.6075}} \\
 &= \frac{28.70}{\sqrt{61.6525}} \\
 &= \frac{28.70}{7.854} \\
 &= 3.65
 \end{aligned}$$

$$\underline{B_3 - I}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\
 &= \frac{(-22.09) - (9.85)}{\sqrt{30.0187 + 42.0317}} \\
 &= \frac{31.94}{\sqrt{72.0504}} \\
 &= \frac{31.94}{8.488} \\
 &= 3.76
 \end{aligned}$$

$$\underline{B_4 - D}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\
 &= \frac{(47.79) - (5.25)}{\sqrt{54.3954 + 57.6917}} \\
 &= \frac{42.54}{\sqrt{112.0871}} \\
 &= \frac{42.54}{10.587} \\
 &= 4.02
 \end{aligned}$$

$$\underline{F_1 - C}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\
 &= \frac{(-1.45) - (55.87)}{\sqrt{119.9749 + 93.4605}} \\
 &= \frac{57.32}{\sqrt{213.4354}} \\
 &= \frac{57.32}{14.609} \\
 &= 4.92
 \end{aligned}$$

$$\underline{F_2 - S}$$

$$\begin{aligned}
 t &= \frac{M_1 - M_2}{\sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}} \\
 &= \frac{(-12.33) - (8.39)}{\sqrt{73.6105 + 95.6438}} \\
 &= \frac{-20.72}{\sqrt{169.2543}} \\
 &= \frac{-20.72}{13.009} \\
 &= 1.59
 \end{aligned}$$