



/\* This is the second application problem given on page 106-107 of Greene \*/

/\* Only a partial set will be solved \*/

/\* Read in the data set \*/

**data** app2;

input id year cost q pl sl pk sk pf sf;

cards;

1 1970 0.213 8.00 6869.47 0.3291 64.945 0.4197 18.000 0.2512

4 1970 3.043 869.00 8372.96 0.1030 68.227 0.2913 21.067 0.6057

5 1970 9.406 1412.00 7960.90 0.0891 40.692 0.1567 41.530 0.7542

14 1970 0.761 65.00 8971.89 0.2802 41.243 0.1282 28.539 0.5916

15 1970 2.259 295.00 8218.40 0.1772 71.940 0.1623 39.200 0.6606

16 1970 1.342 183.00 5063.49 0.0960 74.430 0.2629 35.510 0.6411

17 1970 0.616 50.00 9204.24 0.2963 90.470 0.0981 32.070 0.6056

20 1970 0.489 14.00 5438.89 0.2994 86.110 0.4571 34.150 0.2435

22 1970 1.147 90.00 7189.67 0.2855 79.101 0.2073 21.503 0.5072

25 1970 7.549 2969.00 8183.34 0.2397 80.657 0.3972 9.000 0.3631

27 1970 2.053 374.00 7884.94 0.2054 82.485 0.1208 26.301 0.6737

28 1970 0.636 67.00 6696.50 0.2447 58.258 0.3674 25.400 0.3879

30 1970 3.150 378.00 7895.43 0.0980 60.277 0.1996 42.468 0.7024

31 1970 10.314 1886.00 6833.93 0.0826 67.680 0.4070 25.600 0.5104

32 1970 5.849 1025.00 7093.32 0.2164 68.227 0.2455 22.279 0.5382

35 1970 4.505 467.00 8410.34 0.2474 76.300 0.1917 26.850 0.5610

36 1970 5.597 938.00 7703.26 0.1577 77.197 0.2342 25.400 0.6080

38 1970 3.726 643.00 7332.13 0.2666 64.506 0.2428 21.162 0.4905

41 1970 6.007 1328.00 6680.77 0.1082 51.817 0.2611 25.232 0.6307

44 1970 12.783 2632.00 8469.84 0.0800 70.295 0.2604 30.971 0.6596

45 1970 6.621 856.00 8033.72 0.1463 67.680 0.2083 39.581 0.6554

46 1970 9.643 2689.00 6364.40 0.0829 78.440 0.2105 23.489 0.7067

47 1970 8.685 1627.00 7912.40 0.1105 79.220 0.2071 31.680 0.6824

48 1970 8.637 1090.00 8507.92 0.2399 39.127 0.1796 33.900 0.5805

50 1970 11.242 2258.00 6892.61 0.0997 81.096 0.2309 29.100 0.6694

55 1970 6.622 1500.00 7588.70 0.1221 82.840 0.3186 21.395 0.5594

57 1970 10.967 2506.00 7412.36 0.1164 57.240 0.2152 27.421 0.6684

58 1970 13.627 2437.00 7846.06 0.1210 65.565 0.2578 30.671 0.6212

59 1970 7.440 1293.00 6821.09 0.2031 78.225 0.3297 21.431 0.4672

61 1970 9.784 1627.00 8355.75 0.1494 76.140 0.2360 31.337 0.6146

62 1970 20.867 3965.00 8403.59 0.1162 74.480 0.2151 33.199 0.6687

65 1970 19.709 2682.00 9484.85 0.1087 81.750 0.1958 50.452 0.6955

67 1970 14.043 2001.00 8611.53 0.0714 74.025 0.1618 30.645 0.7668

68 1970 10.190 2764.00 6338.00 0.1659 66.232 0.2312 21.197 0.6028

69 1970 16.176 2487.00 8088.45 0.1371 66.622 0.1973 32.619 0.6656

71 1970 42.251 7320.00 5879.51 0.0864 92.063 0.2064 39.210 0.7072

75 1970 22.561 3571.00 7297.71 0.1142 78.255 0.1833 41.595 0.7025

76 1970 33.018 6837.00 7310.15 0.1187 69.795 0.2515 28.441 0.6298

77 1970 18.896 2020.00 10806.20 0.1797 79.570 0.1594 46.900 0.6609

78 1970 13.268 2445.00 8764.75 0.1317 76.140 0.2411 28.365 0.6271

80 1970 21.545 3981.00 8186.05 0.1052 75.082 0.2299 35.205 0.6650

81 1970 35.530 6770.00 7798.26 0.1108 67.570 0.2814 29.825 0.6078

82 1970 29.801 4187.00 7996.44 0.1052 74.120 0.1824 47.426 0.7125

85 1970 30.877 5643.00 10182.49 0.1722 61.040 0.2204 27.850 0.6074

87 1970 24.357 6793.00 6336.88 0.1266 70.295 0.3253 18.591 0.5481

89 1970 17.480 4148.00 7536.89 0.1176 74.025 0.2035 24.584 0.6789

91 1970 19.901 5785.00 7969.55 0.1093 71.910 0.2180 22.245 0.6727

92 1970 28.786 9660.00 6686.73 0.0697 79.542 0.2391 20.263 0.6913

94 1970 27.083 7896.00 7119.96 0.1196 74.513 0.2484 20.110 0.6320

95 1970 22.442 5648.00 8954.12 0.0834 78.440 0.2111 25.916 0.7055

96 1970 30.207 5286.00 7084.10 0.0884 73.325 0.1969 38.338 0.7147

97 1970 30.168 9602.00 7054.18 0.0928 59.977 0.2164 20.201 0.6908

100 1970 32.584 7930.00 7119.01 0.1209 48.997 0.2772 22.838 0.6018

102 1970 47.386 9530.00 7624.57 0.1266 83.880 0.2106 31.583 0.6628

103 1970 24.290 5316.00 9759.83 0.1894 74.025 0.1740 27.838 0.6366

104 1970 31.292 7484.00 8063.73 0.1713 67.680 0.2535 23.527 0.5752

105 1970 31.988 10149.00 6437.92 0.1169 73.140 0.2367 18.534 0.6464

106 1970 41.902 12954.00 6460.64 0.0865 62.330 0.2194 21.755 0.6941

109 1970 58.115 17875.00 6288.41 0.0658 73.395 0.2781 20.619 0.6561

110 1970 40.528 6891.00 6769.55 0.0895 74.120 0.2393 35.965 0.6711

111 1970 37.067 6754.00 10177.89 0.2070 77.197 0.2363 25.621 0.5566

112 1970 25.169 6779.00 7826.93 0.1427 74.200 0.2662 20.279 0.3909

113 1970 45.183 12936.00 8320.06 0.1027 65.760 0.1992 22.033 0.6981

114 1970 55.176 10855.00 8061.96 0.1192 71.490 0.2362 31.760 0.6445

115 1970 41.180 9275.00 8657.53 0.1047 76.140 0.3287 24.580 0.5666

117 1970 80.359 16311.00 7282.61 0.0527 81.550 0.1337 40.969 0.8136

118 1970 68.480 12542.00 8142.84 0.1336 80.385 0.1688 35.788 0.6976

119 1970 97.386 13846.00 7786.37 0.1003 88.540 0.2066 44.157 0.6931

120 1970 52.763 9145.00 10373.50 0.2027 81.750 0.1997 35.808 0.5976

123 1970 38.847 10057.00 6035.95 0.0844 81.578 0.2178 25.824 0.6978

125 1970 48.113 11114.00 8413.86 0.1301 69.975 0.2969 22.554 0.5730

126 1970 79.071 12706.00 9282.51 0.1108 70.853 0.2011 37.248 0.6880

127 1970 111.886 23217.00 6873.73 0.0849 83.880 0.2007 33.394 0.7144

129 1970 77.885 13702.00 7113.79 0.1212 70.850 0.2121 34.962 0.6667

130 1970 87.102 27708.00 6378.23 0.1060 63.600 0.2257 20.300 0.6683

132 1970 57.727 10004.00 6472.86 0.1806 76.300 0.2362 28.096 0.5832

135 1970 90.717 17280.00 9191.47 0.0918 72.967 0.1795 36.882 0.7287

137 1970 183.232 27118.00 9914.36 0.1280 78.480 0.2265 41.758 0.6455

138 1970 169.235 38343.00 9117.16 0.0663 65.992 0.2192 31.590 0.7144

139 1970 76.253 11667.00 10436.32 0.1120 80.660 0.1708 46.070 0.7172

140 1970 134.228 19445.00 9829.32 0.1756 67.580 0.1834 38.803 0.6410

141 1970 168.378 34212.00 5683.83 0.0651 80.385 0.1361 40.529 0.7988

142 1970 125.336 24001.00 8047.35 0.0998 74.372 0.2457 33.093 0.6544

143 1970 191.563 30958.00 9810.10 0.1636 69.541 0.1524 36.308 0.6840

144 1970 240.514 29613.00 9312.93 0.1561 81.750 0.2017 41.887 0.6422

146 1970 0.130 4.00 6009.70 0.2001 92.650 0.1273 33.199 0.6725

147 1970 0.729 60.00 7972.71 0.1478 75.464 0.2967 33.707 0.5555

148 1970 1.771 153.00 10963.90 0.2555 57.612 0.1918 46.160 0.5527

149 1970 2.237 198.00 7046.50 0.2169 64.945 0.1969 38.000 0.5861

150 1970 2.559 243.00 7000.81 0.1727 81.750 0.1948 33.436 0.6325

151 1970 2.036 617.00 9547.72 0.1194 81.750 0.3000 18.490 0.5807

152 1970 7.624 1340.00 6438.42 0.0930 79.220 0.1877 38.148 0.7193

153 1970 11.109 1961.00 6964.81 0.1317 82.485 0.3176 28.263 0.5507

154 1970 9.467 2233.00 6717.18 0.0959 59.957 0.3030 22.693 0.6011

155 1970 13.826 2582.00 8334.89 0.1022 77.531 0.2266 34.181 0.6712

156 1970 17.290 2763.00 8058.91 0.0960 80.660 0.2023 45.664 0.7018

157 1970 16.170 2863.00 7509.37 0.1783 81.550 0.1992 30.237 0.6225

158 1970 24.398 3490.00 8477.23 0.1915 75.420 0.2320 38.000 0.5765

159 1970 27.244 4568.00 9619.76 0.1692 76.140 0.2316 35.665 0.5992

160 1970 29.487 5292.00 8176.33 0.2233 76.140 0.2532 22.837 0.5236

161 1970 35.109 5699.00 7988.48 0.1269 80.370 0.2140 42.635 0.6590

162 1970 25.481 5702.00 6947.11 0.1833 78.225 0.2503 24.260 0.5664

163 1970 42.412 8650.00 7146.67 0.1462 72.967 0.2371 27.869 0.6167

164 1970 72.036 12724.00 8037.84 0.1259 74.025 0.1970 37.517 0.6771

165 1970 146.989 25147.00 9900.76 0.0857 75.725 0.3334 33.474 0.5809

166 1970 51.742 10361.00 9578.63 0.1913 68.016 0.2407 28.142 0.5680

167 1970 21.559 3886.00 9538.68 0.1252 63.569 0.2033 30.889 0.6715

168 1970 14.271 1901.00 9822.64 0.2144 69.411 0.1596 36.000 0.6260

169 1970 66.103 11837.00 8709.43 0.1627 75.379 0.2103 31.332 0.6269

170 1970 113.256 22522.00 9500.78 0.1961 76.732 0.2604 25.029 0.5435

171 1970 90.372 21956.00 7954.47 0.1169 83.338 0.2984 22.912 0.5847

172 1970 240.486 53918.00 6068.87 0.0966 78.380 0.1846 31.195 0.7188

173 1970 277.297 72247.00 7419.92 0.1081 56.301 0.2607 25.091 0.6312

174 1970 107.978 18455.00 6690.23 0.1513 76.300 0.2101 32.965 0.6386

175 1970 269.773 46870.00 9761.38 0.1594 69.541 0.2194 33.200 0.6212

176 1970 79.621 16508.00 9404.97 0.1501 78.044 0.1556 42.209 0.6943

177 1970 33.881 7382.00 7512.72 0.1393 72.362 0.2468 25.900 0.6140

178 1970 14.953 2325.00 8568.23 0.1466 53.890 0.1269 38.916 0.7265

179 1970 33.973 5708.00 10024.20 0.0986 78.102 0.1826 42.166 0.7188

180 1970 78.703 17132.00 8160.80 0.1604 78.899 0.2552 25.538 0.5844

181 1970 19.439 4560.00 8558.37 0.1531 76.464 0.2577 23.778 0.5893

182 1970 282.248 48240.00 9673.38 0.1405 70.770 0.1612 36.510 0.6983

183 1970 282.940 53760.00 9619.90 0.1667 73.460 0.1977 34.640 0.6356

184 1970 469.185 66490.00 9138.03 0.1353 78.980 0.2017 41.010 0.6630

185 1970 737.409 115500.00 8438.80 0.1347 76.620 0.2027 38.850 0.6626

186 1970 20.884 6259.00 6697.02 0.0966 69.764 0.2164 21.292 0.6870

187 1970 21.779 6746.00 9419.27 0.1263 49.778 0.2418 20.100 0.6319

188 1970 22.844 3789.00 6429.54 0.1088 76.300 0.2241 34.259 0.6671

189 1970 31.637 4617.00 6488.39 0.1761 70.806 0.1633 41.989 0.6606

190 1970 48.168 9326.00 7131.92 0.1565 81.794 0.2450 26.892 0.5985

191 1970 5.928 723.00 6432.54 0.2068 62.086 0.1218 43.884 0.6714

192 1970 25.609 6604.00 7714.34 0.1261 90.870 0.2842 21.269 0.5896

193 1970 17.463 3972.00 6446.05 0.1212 88.540 0.3361 23.469 0.5426

194 1970 1.364 154.00 8290.99 0.2740 87.465 0.1638 35.780 0.5622

195 1970 46.799 11226.00 8885.39 0.1171 83.886 0.1254 23.626 0.5875

196 1970 50.209 13030.00 6735.00 0.1223 55.920 0.2386 26.164 0.6392

197 1970 40.894 9553.00 7287.17 0.1269 61.335 0.2552 26.847 0.6179

198 1970 24.723 5331.00 7861.41 0.0459 43.418 0.3870 28.478 0.5670

199 1970 30.224 6904.00 11145.22 0.0932 31.725 0.3597 25.180 0.5471

200 1970 31.216 9057.00 10599.86 0.1092 31.725 0.2989 21.580 0.5919

201 1970 106.273 28372.00 7502.93 0.1204 66.580 0.2339 24.443 0.6457

202 1970 55.362 13073.00 7024.36 0.1733 76.320 0.1735 26.281 0.6533

203 1970 23.479 4906.00 6738.30 0.0832 82.668 0.2564 28.716 0.6604

204 1970 22.262 5601.00 7581.69 0.0992 68.858 0.2074 26.615 0.6934

205 1970 30.471 8060.00 7000.00 0.0576 37.058 0.1754 30.770 0.7669

206 1970 113.591 22277.00 5571.05 0.1022 82.668 0.1725 36.037 0.7254

207 1970 88.099 26521.00 6890.26 0.1069 68.644 0.2296 20.517 0.6635

208 1970 111.924 31908.00 6971.54 0.0848 75.218 0.2286 23.092 0.6866

209 1970 119.374 33820.00 7263.52 0.0992 70.808 0.2286 22.148 0.6722

210 1970 12.324 2816.00 13044.00 0.0893 58.860 0.2946 30.590 0.6161

211 1970 0.316 16.30 7727.77 0.1700 38.106 0.1767 33.460 0.6533

212 1970 10.529 1823.00 10029.47 0.0761 69.760 0.1724 36.000 0.7515

213 1970 22.200 4800.00 12742.47 0.1239 33.840 0.1678 32.250 0.7083

214 1970 6.829 946.60 10642.16 0.0883 43.600 0.1914 51.463 0.7203

215 1970 3.761 377.00 7432.24 0.2117 74.120 0.2274 33.436 0.5609

216 1970 3.982 391.00 5826.04 0.1926 78.288 0.0924 44.633 0.7151

217 1970 30.188 5317.00 9586.63 0.0845 78.008 0.2009 41.840 0.7147

218 1970 67.856 15220.00 6986.09 0.1451 74.025 0.2596 25.662 0.5945

;

/\* Check the quality of the data \*/

**proc** **contents** data=app2;

**run**;

**proc** **print** data=app2 (obs=**20**);

**run**;

/\* Transform the data as suggested by the model \*/

**data** app2;

set app2;

L\_C=log(cost/pf);

L\_Q=Log(q);

F\_L\_Q=**0.5**\*log(q)\*log(q);

L\_pk=log(pk/pf);

L\_pl=log(pl/pf);

**run**;

/\* This is Part A \*/

**proc** **reg** data=app2 outest=cov covout;

model L\_C=L\_Q F\_L\_Q L\_pk L\_pl;

**run**;

**proc** **print** data=cov;

**run**;

/\* You can easily calculate the Delta\_F for part b using 1-L\_pk-L\_pl \*/

/\* You can also calculate the standard error by using SQRT(VAR(L\_pk) + Var(L\_pl) - 2Cov(L\_pk, L\_pl));

/\* Use the COV matrix as produced by the print statement for this \*/