Homework #1

i)

ii.

i) 68.08847

ii) 68.30819

iii) (2.06 · 927) = 1913.88 ; Covariance Matrix

v) 2.06 ; Covariance Matrix S_{xy}

v) $\cancel{S_{xy} = \frac{\Sigma(x_i-\bar{x})(y_i-\bar{y})}{n-1} \times \frac{n-1}{1}}$

$(n-1)(S_{xy}) = \Sigma(x_i-\bar{x})y_i$

$= S_{xy} = \boxed{2.06}$

$\frac{\Sigma(x_i-\bar{x})y_i}{n-1}$

$\frac{\cancel{(n-1)}(S_{xy})}{\cancel{n-1}}$

vi) By similar logic as v), $\boxed{2.06}$

$(n-1)(S_{xy}) = \frac{\Sigma x_i(y_i-\bar{y})}{\cancel{n-1}}$

$\frac{\Sigma(x_i)(y_i-\bar{y})}{n-1}$

$= \frac{\cancel{(n-1)}(S_{xy})}{\cancel{n-1}}$

vii. $S_{xx} = \cancel{(6.34)}^2$ $3.19 \times 927 = \boxed{2957.13}$

viii. $s_x^2 = \boxed{3.19}$; Covar Matrix

ix. $S_{yy} = 6.34 \times 927 = \boxed{5877.18}$

x. $S_y^2 = 6.34$; Covar Matrix

xi. $r = \cancel{.45}$ .46 ; Pearson's correlation Coefficients

$r_{xy} = \frac{S_{xy}}{S_x S_y}$

$= \frac{2.06}{(3.19)(6.34)} = \frac{2.06}{\sqrt{20.2246}}$

$= \frac{2.06}{4.50}$

$= .457$

1c) $\hat{y} = \beta_0 + \beta_1 x_1$ $\qquad \hat{y} = \bar{y} - \left(r_{xy}\frac{s_y}{s_x}\right)\bar{x}$

$\beta_0 = \bar{y} - \hat{\beta}_1\bar{x}$

$\beta_1 = \frac{\Sigma(x_i-\bar{x})(y_i-\bar{y})}{\Sigma(x_i-\bar{x})^2} = \boxed{r_{xy}\frac{s_y}{s_x}} = (.46)\left(\frac{6.34}{3.19}\right) = \boxed{.91}$

2) $\rho = \frac{1}{2}\sqrt{n-3}\log\frac{1+R}{1-R} \dot{\sim} N(0,1)$ $\qquad r = .46$

$z(0) = .5\sqrt{20-3}\,\log(1.46/.54) =$

$.5(4.12)(.995) = 2.0497$

$\alpha = .05$ $\qquad$ $z(0) = 2.0497 > 1.96$, thus $\rho = 0/H_0$ we reject

C.I. of 95%: $(\cancel{.40}\,.41, .51)$ Per SAS Pearson Corr stats w/ Fisher's Z

3) $\frac{1+R}{1-R}$ $\frac{1+-.45}{1--.45} = \frac{.55}{1.45} = \cancel{.37}\,.38$ $\qquad e^{\frac{-3.92}{\sqrt{17}}} = \cancel{.38}\,.39$

$.38e^{-2(1.96)/\sqrt{n-3}} - 1$ $\qquad \frac{1+R}{1-R}e^{-2z/\sqrt{n-3}} - 1$

$e^{\frac{3.92}{\sqrt{17}}} = 2.58762$

$\frac{.38(.39)-1}{.38(.39)+1}$ $\qquad \frac{(.38)\overset{(2.59)}{\cancel{(.39)}}-1}{(.38)(2.59)+1} = \frac{.9842-1}{.9842+1}$

$\frac{.1482-1}{.1482+1} = \frac{-.85}{1.15} = \boxed{-.74}$ $\qquad = \frac{-.0158}{1.9842} = \boxed{-.00796}$

$\boxed{(-.74, -.008)}$

3] $\rho = .6 \quad Pr(R > .7;\ \rho = .6) \quad n = 30$

$P\left(\frac{1}{2}\sqrt{n-3}\left(\log \frac{1+R}{1-R}\right) - \log\left(\frac{1+\rho}{1-\rho}\right)\right)$

$.5\sqrt{27}\ \log\left(\frac{1.7}{.3}\right) - \log\left(\frac{1.6}{.4}\right)$

$(.5\sqrt{27})\ \log(5.67) - \log(4)$

$= .906$

$P(Z > .9) = .18$

or 18%

$N(0,1)$