$Student Number _$

STA 431s13 Quiz 3

Recall $Corr(X,Y) = \frac{Cov(X,Y)}{\sqrt{Var(X)Var(Y)}}$, and if

W = X + e, the reliability of W is defined as $Corr(W,X)^2 = \frac{\sigma_X^2}{\sigma_x^2 + \sigma_y^2}$

1. (6 points) Suppose we have two equivalent measurements with uncorrelated measurement error:

$$W_1 = \nu + X + e_1$$

$$W_2 = \nu + X + e_2,$$

where $E(X) = \mu$, $Var(X) = \sigma_X^2$, $E(e_1) = E(e_2) = 0$, $Var(e_1) = Var(e_2) = \sigma_e^2$, and X, e_1 and e_2 are all independent. Let $S = W_1 + W_2$.

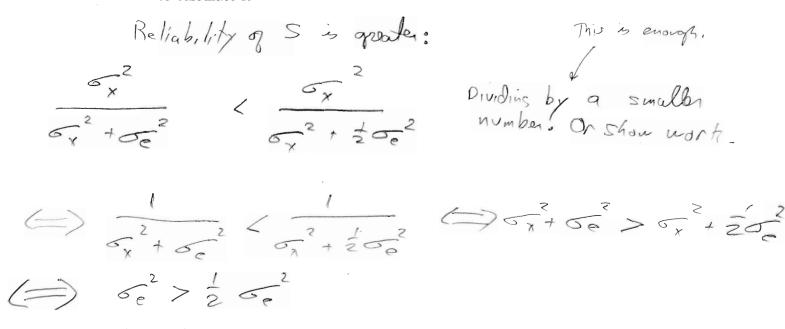
(a) Calculate the reliability of S. Show your work. You may use the centering rule if you wish.

S=
$$2\gamma + 2\chi + e_1 + e_2$$
, $Von(s) = 4\sigma_x^2 + 2\sigma_e^2$
 $Cov(s,\chi) = Cov(s,\chi) = E(s\chi)$

Reliability of S is Corn (S,X) = Cov(S,X)

$$= \frac{26x^{2}}{146x^{2}+26e^{2}} \sqrt{6x^{2}} = \frac{46x^{2}6x^{2}}{(46x^{2}+26e^{2})6x^{2}}$$

(b) Which is greater, the reliability of W_1 , or the reliability of S? Answer the question and show some work. The reliability of W_1 is given on side one; you don't have to calculate it



2. (4 points) For the SAT data, what is the sample standard deviation of Grade Point Average? The answer is a number from your printout. Circle the number on your printout. Do not answer this question if you don't have a printout.

0.5802910

Please attach your log file and your list file to the quiz paper. Make sure your name is written on both printouts.