Name _____

Student Number _____

STA 431 Quiz 9

1. Let

$$\begin{aligned} z_1 &= \lambda_1 F_1 + \lambda_2 F_2 + \lambda_3 F_3 + e_1 \\ z_2 &= \lambda_4 F_1 + \lambda_5 F_2 + \lambda_6 F_3 + e_2 \end{aligned}$$

where all expected values are zero, variances of the factors equal one, and all the factors and error terms are independent. As the notation suggests, $Var(z_1) = Var(z_2) = 1$. Only z_1 and z_2 are observable. Please give Greek letter answers to the following.

(a) (2 points) What is $Var(e_1)$? Show a bit of work. **Circle your answer.**

(b) (1 point) What is $Corr(z_1, F_3)$? Show a bit of work.

(c) (1 point) What is the reliability of z_1 as a measurement of F_1? Just write down the answer.

(d) (2 points) What is the reliability of $s = z_1 + z_2$ as a measurement of F_1? Show your work. **Circle your answer.**

2. For the R part of the assignment (last question), you fit a 4-factor model to the `statclass` data.

   (a) (2 points) What is the estimated correlation between Factor 2 and mark on Computer Assignment 5? The answer is a number from your printout. *Write the answer in the space below.* Circle the number on your printout, and write "Q2a" beside it.

   (b) (2 points) What estimated proportion of the variance of the Midterm is explained by the common factors? The answer is a number from your printout. *Write the answer in the space below.* Circle the number on your printout, and write "Q2b" beside it.

Please attach your printout to the quiz paper. The printout should show your *complete* R input and output. Make sure your name and student number appear on the printout.