STA 312F07 Quiz 11

1. Consider the confirmatory factor analysis model

$$
\begin{aligned}
X_1 &= F_1 + e_1 \\
X_2 &= \lambda_2 F_1 + e_2 \\
X_3 &= \lambda_3 F_1 + e_3 \\
X_4 &= F_2 + e_4 \\
X_5 &= \lambda_5 F_2 + e_5 \\
X_6 &= \lambda_6 F_2 + e_6,
\end{aligned}
$$

where $e_1, \ldots, e_6$ are independent of one another and of F_1 and F_2, all expected values are zero, $V(e_i) = \psi_i$ for $i = 1, \ldots, 6$,

$$
V \begin{bmatrix} F_1 \\ F_2 \end{bmatrix} = \begin{bmatrix} \phi_{11} & \phi_{12} \\ \phi_{12} & \phi_{22} \end{bmatrix},
$$

and $\lambda_2, \lambda_3, \lambda_5$ and λ_6 are nonzero constants.

   (a) Give the covariance matrix of the observable variables. Show your work.

   (b) Is this model identified? Answer Yes or No and prove your answer.

2. What do you think would happen if we added a third factor to the model of Question 1? Would it be identified? You don't have to do any calculations; just think about it and see the pattern.

Total Marks = 10 Points