Find a longitudinal data set, preferably from your field. It should not be one mentioned in our text (see the appendix). It should be real data that is related to a scientific question of interest. It should have at least 20 subjects, at least 5 observations per subject, and at least 2 other covariates describing each subject (such as gender). For ease of exploring correlations, I suggest that the observations should be from fixed times, not random times.

About the data Write a paragraph or two describing the data set. Be sure to include:

- What is it about? What are the variables, how was it collected, and what scientific question might be answered by analyzing it?
- What makes it a longitudinal data set? Be specific. Why might we need longitudinal methods to analyze it?
- Describe the size of the data set. How many subjects and how many observations per subject does it have? Specifically define the levels of data it has.

Data manipulation

- Use the reshape package to melt it into long format, if needed. Show the output of the first few rows. If you don't need to reshape it, show the first few rows and explain why it is already in long format.
- Cast it in two different ways (using an aggregate function at least once) to put it into a format that you find interesting in some way. (Casting it back to its original form is fine.) Show at least the first few rows of the output.
- Explain why you chose to cast it in that way and describe what you found interesting.
- If you didn't have to melt the original data set, melt one of your "casted" data sets into long format.

Profile plots Make at least four versions of profile plots of your data, grouping and splitting the data in different ways to explore how the response varies by time and the other covariates. Write about why you chose each plot and what you discover. Be sure to include:

- Why are profile plots a useful tool for exploring longitudinal data? Why did you choose these particular versions?
- Overall, what did you find out about the mean, the variance, the skewness, and any possibly outliers?
- Does it appear that any of these differ depending on the values of any of the covariates?
- What do the plots suggest about the scientific questions the data address?

Correlations Finally, explore the correlations between the observations.

- First, explain why it is important to do this in longitudinal data.
- Compute the correlation matrix and make a correlogram. What patterns do you see? How do the correlations change with lag?
- Make pairwise scatterplots between the observations. What do you notice? Does this confirm what you saw in the correlation matrix?

Please limit yourself to ten pages. Also, no more than three collaborators should share the same data set. If you choose to collaborate, please acknowledge your collaborators. Also remember that you are expected to run all of the computer code you present yourself, and you should phrase your responses in your own words.