**PSQF 7375 section 0006 Advanced Longitudinal Models HW1:   
Reviewing Concepts in Longitudinal Multilevel Models (10 points total)  
  
Effort Draft: worth 5 points due Monday 1/30/2023 by 11:59 PM via ICON**Please submit your document (in .docx, .doc, or .rtf format) using this naming convention:  
PSQF7375\_Lastname\_ Firstname\_HW1E **Accuracy Draft: worth 5 points due Monday 2/20/2023 by 11:59 PM via ICON**Please submit your document (in .docx, .doc, or .rtf format) using this naming convention:  
PSQF7375\_Lastname\_ Firstname\_HW1A

The goal of HW1 is to test your recall of the principles and practice of longitudinal multilevel modeling as you’ve learned it so far (i.e., in which occasions at level 1 are modeled as nested within persons at level 2). Begin by trying to answer these questions from memory; let any initial uncertainty serve as an indication for what you need to review (using the textbook chapters as noted from which these review questions were generated). Then try to answer the questions on your own by writing up to a short paragraph under each “Answer” below. You will first **submit an “effort” draft in which you can earn up to 5 points based on the completeness of your responses (0.5 points per question)**, but no instructor feedback will be provided.  
  
We will then discuss these questions in class on Thursday 2/2/23, in which you will be expected to present your own answers and/or ask further questions as needed to clarify these concepts. After the class discussion, you can revise your answers before **a second grade of up to 5 more points is assigned (0.5 points per question) based on the accuracy of your answers**. You do not need to use “track changes” (given that I won’t be providing feedback on the “effort” draft).

1. (ch. 1) How does a *between-person* relationship differ from a *within-person* relationship? Provide an example of each type from your own area of research or experience.  
     
   Answer:
2. (ch. 1 and 5) What is the difference between a *fixed effect* and a *random effect*? To which side of the model (means or variance) does each type of effect belong?  
     
   Answer:
3. (ch. 3) Why is it necessary to consider what to include in the model for the variance in longitudinal data? Refer in your answer to the statistical and substantive reasons for doing so.

Answer:

1. (ch. 3) What kinds of model comparisons can be made using −2LL, AIC, and BIC indices when using maximum likelihood (ML) versus residual maximum likelihood (REML)? Provide examples.  
     
   Answer:
2. (ch. 3) How does one fit the univariate and multivariate variants of repeated measures ANOVA models as multilevel models (i.e., what goes into each side of the model to do so)? What are the limitations of these ANOVA models *as traditionally estimated using ordinary least squares* for longitudinal data?  
     
   Answer:
3. (ch. 4) What is the difference between alternative covariance structure models that use only the **R** matrix versus those that use the **G** and **R** matrices? What advantage does the latter have?  
     
   Answer:
4. (ch. 5) What are the relationships among and the contents of the **Z**, **G**, **R**, and **V** matrices?   
     
   Answer:
5. (ch. 5) How is dependency of residuals captured by adding random effects? Can adding random effects “explain” the variance in an outcome? Why or why not?  
     
   Answer:
6. (ch. 6) What is the purpose of including fixed and random effects related to change over time? Which of these two types of effect should be included in the model before the other, and why?  
     
   Answer:
7. (ch. 7) What are the roles of time-invariant predictors in the model for the means in a longitudinal analysis? How do these roles relate to which source of variance should be explained by each fixed effect of a time-invariant predictor?

Answer: