Personality Assessment Homework Set 2

Consider the relationships between ability, motivation, and performance summarized in the following correlation matrix. This is a data set with the following variables: GRE verbal, GRE quantitative, GRE advanced, Need-Achievement, Test Anxiety, GPA after the first year of graduate school, rated quality of the MA thesis, and rated quality of the Prelim exams. These variables have the following means, standard deviations, and intercorrelations:

	GREV	GREQ	GREA	N-Ach	Anx	GPA	MA	Pre
GREV	.81							
GRE Q	.72	.64						
GRE A	.54	.48	.72					
N-Ach	.00	.00	.42	.49				
ANX	.00	.00	-.48	-.56	.64			
GPA	.38	.34	.55	.34	-.39	.49		
MA	.32	.29	.47	.29	-.34	.42	.36	
Pre	.27	.24	.39	.25	-.28	.35	.30	.25
Means	600	650	700	5	12	3.2	6	5
Sigma	80	100	50	2	4	.5	2	3

Note that the correlations along the diagonal are in fact **reliabilities** rather than correlations.

1) What is the measure with the greatest reliability?

2) What is the measure with the lowest reliability?

3) What is the correlation between GRE Advanced and the rated quality of Prelims?

4) If a person has a GRE verbal score of 680, then what would you expect his/her GRE quantitative score to be?

5) For a person with an anxiety score of 16, what is the expected GPA?

6) Assuming the classical model of partial correlations, what is the correlation between GRE Quantitative and GPA with GRE Verbal held constant?

7) What is the multiple correlation of GRE V and GRE Q with rated quality of the MA?

8) What is the unit weighted correlation of GREV and GRE Q with MA.

9) What is the unattenuated correlation between Anxiety and GPA?

10) If we could increase the reliability of N-ach from .49 to .81, what would happen to the correlation of N-ach with Prelims?

11) If we selected the 10 best students on the basis of their GRE Q scores and found that their mean was 750, what would we! expect them to get if we gave them the GRE Q again?

12) What would be the coefficient alpha of the composite performance measure made up of standard scores of the three measures of performance?   (Note that there are two ways of finding this. Assume that you do not know the reliabilities of the single measures.)

13) What is the correlation of GPA with this composite?

14) Assuming that all the component scores were standardized, what is the variance of the composite of the first three measures?

15) What is the coefficient alpha of this composite (again, assuming no knowledge of their separate reliabilities.)

16) What is the correlation of this composite with the performance! composite found in question 12?

17) If a ten item test has an average inter-item r of .15, and the items have been standardized,
a) what is the variance of the test?
b) what is coefficient alpha for this test?

18) If another test with 10 items has an average inter-item r of . 2 and an average item correlation with the first test (see above) of .1,
a) what is the reliability of the second test?
b) what is the covariance of the first with the second test?
c) what is the correlation between these two tests?
d) what is the correlation corrected for attenuation?

19) When we break N-ach and GREV into high and low groups, we notice the following 2x2 table of GPAs:
Hi-Nach   3.7   3.9
Lo-Nach   3.0   3.5
            Low   High   GRE V

The interaction of N-ach and GRE V is statistically significant. One inteprepretation of this interaction is that ability makes more difference for less motivated students than it does for more motivated students. Is this a reasonable interpretation of the data? Is there another plausible explanation?

20) Suppose we take the previous data set and find that when we break it up by anxiety as well as GRE V and N-Ach that we have the following pattern:

	Low Anxious				High Anxious	
Hi Nach	3.8	4.0			3.0	3.2
Lo Nach	3.0	3.5			2.5	3.0
	Low	High		GRE V	Low	High

Does your interpretatation of the data set change with the addition of these anxiety results? How would you interpret the data now?

21) (Extra Problem) Draw a structural model which represents the data set in problem 1.