STAT505 Assessment #10

1. A data set includes six variables that measure the wellbeing of patients undergoing radiotherapy. The variables are *symptoms* (number of side effect symptoms), activity (amount of daily activity on a 1-5 scale), sleep (quality of sleep on 1-5 scale), eat (food consumed on 1-3 scale), appetite (on a 1-5 scale), and skinreact (measure of skin reaction on 0-3 scale). Following are factor loadings from a factor analysis of the standardized variables. The principal components method was used along with a varimax rotation.

	Factor1	Factor2	Factor3
symptoms	0.763	0.239	0.133
activity	0.899	0.036	-0.057
sleep	0.061	0.898	0.146
eat	0.562	0.556	-0.034
appetite	0.618	0.650	-0.109
skinreact	0.016	0.067	0.985

   (a) Calculate the communality for the symptoms variable. Write a sentence that interprets this value.

   (b) Calculate the specific variance for the symptoms variable. *Recall we're using standardized variables.*

   (c) The total variance explained by a factor is the sum of all squared loadings multiplying that factor. What is the amount of variance (in the six observed variables) that is explained by the first factor?

   (d) What proportion of the total variance in the six observed variables is explained by the first factor?

   (e) Write a brief interpretation of the each factor. That is, characterize each factor if possible.

2. For this problem use the "Pollution" data set. Columns correspond to wind, solar radiation, CO, NO, NO2, O3, and HC.

   (a) Do a factor analysis on all seven variables using the principal components method with two factors. Do a varimax rotation. Also, give the factor loadings after rotation.

   (b) Write a brief characterization/interpretation of each factor.

   (c) Give the communalities (after rotation) for the analysis done in part a.

   (d) What is measured by the communalities given in part c?

   (e) Give the specific variance for each of the seven variables.

   (f) What proportion of the total variance of the seven variables is explained by the first factor?

   (g) Repeat part a but with a three factor model.

   (h) Repeat part b for the three factor model.

   (i) Repeat part c for the three factor model.

   (j) Repeat part d for the three factor model.

   (k) Repeat part e for the three factor model.

   (l) Repeat part f for the three factor model.