

UNM Statistics Qualifying Exam Take-Home

January 2011

Due 12:00pm Jan 18, 2011. Return to Ana Parra Lombard to the Math Dept Office at SMLC Rm 230A

Directions: The answer to each problem should be presented as a summary. It should be word processed and double spaced. An appendix is allowed for each problem but will be examined only at the discretion of the graders. The better organized your appendix is, the more likely it is to get examined.

You may **not** consult any other person when working on this exam or discuss your exam with anyone else regardless of whether or not the person is taking the exam. You may use your course notes as well as any available books or web resources for the exam. Questions pertaining to clarification about these questions can be directed to Yan Lu, luyan@math.unm.edu.

1. The data for this problem is available at:

<http://www.math.unm.edu/~luyan/bodyfat.dat>

Data were collected on 252 females. Response variable is bodyfat (fat). 13 predictor variables were considered in analysis: age (age), weight(weight), height(height), neck measurement (neck), chest measurement(chest) etc,. The amount of body fat for each of the 252 persons was obtained by a cumbersome and expensive procedure requiring the immersion of the person in water. Because it is hard to get the response variable “body fat”, it would be very helpful if a regression model with some or all of these predictor variables could provide reliable estimates of the amount of body fat since the measurements needed for the predictor variables are easy to obtain.

Using the data, build an appropriate regression model. Summarize your findings. Make sure you tell the reader what you found and how you found it. Make sure you include important results in your report and put some necessary outputs in appendix.

2. The data for problem 2 is available at: <http://www.math.unm.edu/~luyan/cream.txt>

Data is from a class experiment did by Vincent Su and Yan Lu. The experimenters wanted to find out an ideal recipe for creme brulee using a random block design.

The measurement of the experiment is the texture (firmness) of Creme Brulee. Ideal Creme Brulee will be not too hard and not too soft. Texture is ranged from 1 to 8 with 1 indicating the softest texture and 8 indicating the hardest texture.

Block in this experiment is person. The experimenters randomly select 4 people from a list of their friends.

Three fixed factors are considered in the experiment, each with two levels.

	Level 1	level 2
Egg Yolks	1 Egg Yolk	2 Egg Yolks
Creme	1/2 Cup of Creme	1/4 cup of Creme
Cooking Methods	Method 1	Method 2

Method 1: We brought cream to a boil, and boiled it about 30 seconds. Poured it immediately into the egg yolks and whisked them together. Returned the mixture to the pan and continued cooking without allowing it to boil. Stirred the mixture until it thickens then poured the mixture into a shallow baking dish. Then, refrigerated it overnight.

Method 2: First we put ramekins in a baking pan and pour enough hot water into pan to come halfway up sides of ramekins. Bake custards approximately 35-40 minutes until the custard was set. Remove the pan from the oven and remove custard cups from the water. Allow custards to cool before placing in the refrigerator. Then chilled it overnight.

Your task is to suggest a recipe of the cream brulee based on the experiment. Make sure you tell the reader what you found and how you found it. Make sure you include important results in your report and put some necessary outputs in appendix.