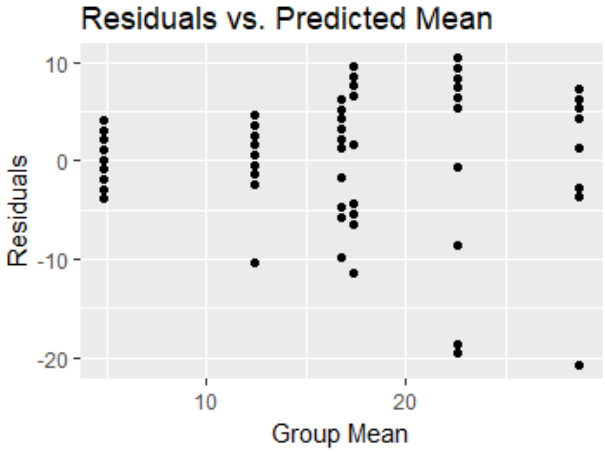
Chapter 14 and 15 Homework

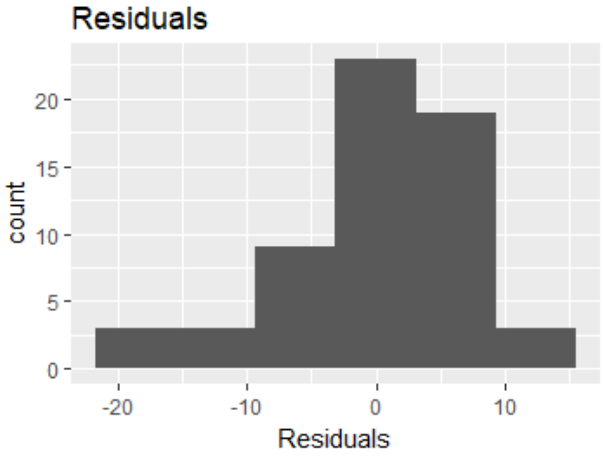
Due 4-8-2018

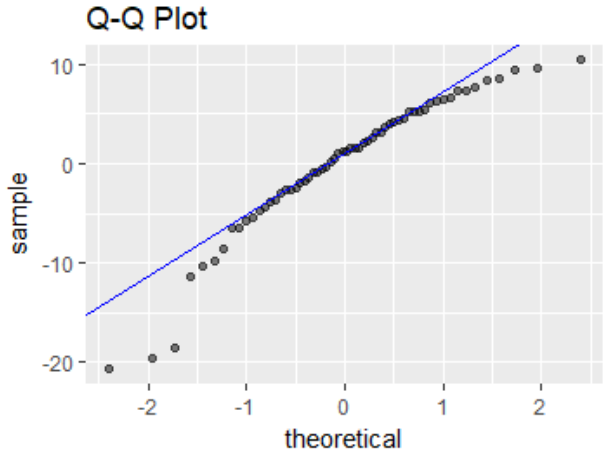
Problem 14.8

(a) Assess ANOVA assumptions using the graph from PROC MIXED.

The most concerning plot is the scatterplot with an apparent pattern as you increase the Group Mean. Though, with a wonky residual histogram and Q-Q Plot that is overpredicting at the extremes this data does not appear to fit a trustworthy ANOVA scenario.







(b) Perform an ANOVA to determine if there is an interaction between the age group and types of products; α = 0:05

Check the Interaction, Reject if $F_{Interaction} > F_{\alpha, df_{Interaction}, df_{Error}}$:

$F_{Interaction} = 0.873 < 3.1682 = F_{0.05,2,54}$
Thus, the interaction is not significant and can be removed from the model.

(c) If there is an interaction, create a probability plot for age group and product type and provide an interpretation for the interaction

Dealing with the Interaction Term

Since the Interaction term of AgeGroup:Products is not significant ($> F_{0.05,2,54} = 3.1682$), we will remove it from our ANOVA model and just look at the Main Effects.

(d) If there is not an interaction, remove the interaction term, recompute the ANOVA table, and determine if there are main effects of age group and product type; α = 0:05

Table 2: ANOVA Table for Attention Spans without Interaction Term

Row Names	SS	df	MS	F	P-Value
Main Effect					
Age Group	1350	2	674.8	13.28	$1.91\text{x}10^{-5}$
Products	1995	1	1995.3	39.26	$5.60\text{x}10^{-8}$
Error	2846	56	50.8		
Total	6191	59			

Checking to see if the F Statistics Are Greater Than $F_{\alpha,df_{MainEffect},df_{Error}}$

$$F_{AgeGroup} = 13.28 > 3.1619 = F_{\alpha,df_{MainEffect},df_{Error}}$$
$$F_{Products} = 13.28 > 4.0130 = F_{\alpha,df_{MainEffect},df_{Error}}$$

Both the Main Effects are statistically significant therefore, we should move onto Post Hoc testing to look at statistically different pairs.

(e) Report significantly different pairs using Tukey's W and $\alpha = 0{:}05$; REMEMBER: if there is an interaction present, we must account for that when performing post-hoc testing

14.10

(a) Assess ANOVA assumptions using the graph from PROC MIXED.

(b) Determine if there is a difference between gasoline blends using ANOVA for Latin Square; $\alpha = 0{:}05$

(c) If there is a difference per part (b), use Tukey's W to determine the significantly different pairs; $\alpha = 0{:}05$

(d) From part (c), which blend (or blends) gives the highest gas mileage?

(e) Determine if there is a difference between gasoline blends using ANOVA for completely randomized designs (i.e., ignore the blocking factors); $\alpha = 0{:}05$

(e) Compare the MSE from part (b) to the MSE from part (e) - what happens when we ignore the blocking factors?

(f) Which would you say is the appropriate analysis?

Chapter 14 and 15 HW

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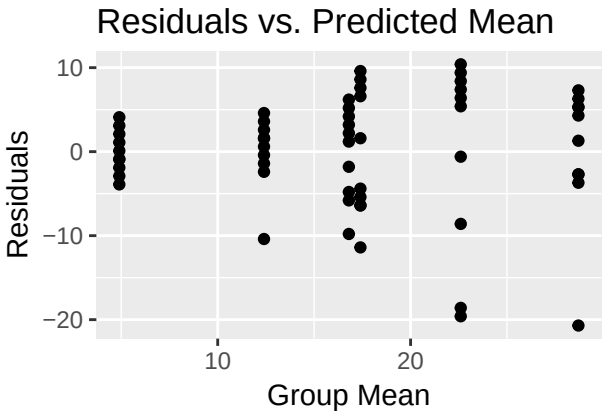
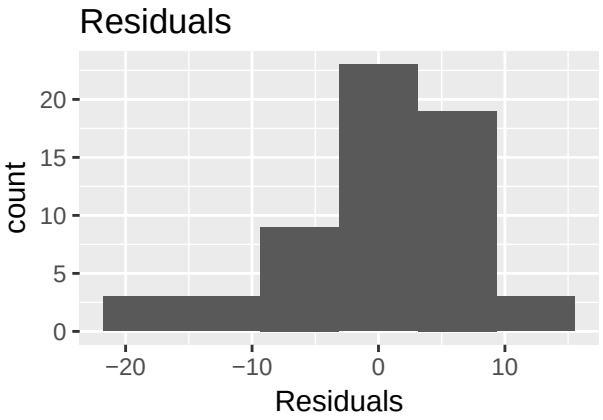
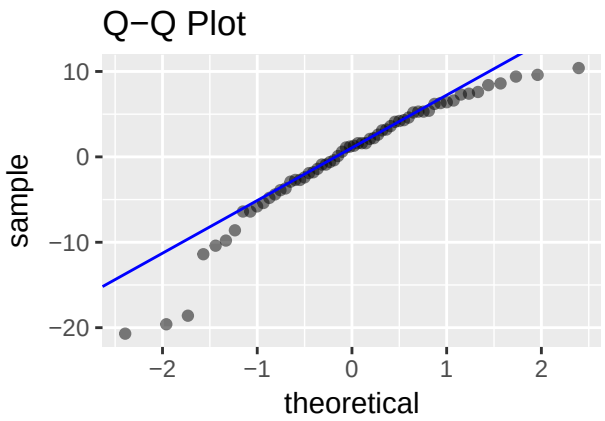
March 30, 2018

14.8 (a) Assess ANOVA assumptions using the graph from PROC MIXED.







14.8 (b) Perform an ANOVA to determine if there is an interaction between the age group and types of products;

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## [1] 3.168246
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## [1] 3.161861
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## [1] 4.012973
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Table 1: ANOVA Table for Attention Spans

Row Names	SS	df	MS	F	P-Value
Main Effect					
Age Group	1349.6333	2	674.81665	12.868	$2.67\text{x}10^{-5}$
Products	1995.2667	1	1995.2667	38.048	$9.15\text{x}10^{-8}$
Interaction					
(Age Group:Products)	14.2333	2	7.1167	0.136	0.873
Error	2831.8000	54	52.4407		
Total	6190.9	59			