Lab 9 – Pamela the Pediatrician

In 2017, a Pamela the Pediatrician was interested in the heights of children (measured in cm). She collected three random samples from three populations according to birth month and did a one-way ANOVA analysis with the data.

Pamela wanted to test this hypothesis: $H_0: \mu_1 = \mu_2 = \mu_3$

	Group 1 born Mar. 2013	Group 2 born Dec. 2012	Group 3 born Sept. 2012
	104	106	110
	106	101	114
	105	107	115
	102	106	110
	99	109	118
		101	118
			113
sample size	5	6	7
sample mean	103.2	105	114
sample variance	7.7	10.8	11

Find $\overline{X}$, the overall mean among all 18 observations in the study. Since the sample sizes are not all equal to each other, $\overline{X}$ will not simply equal the average of the three sample means!

Compute SSA by hand. Use a calculator, but show your work.

Compute SSE by hand. Use a calculator, but show your work.

Complete the ANOVA table:

Source	d.o.f.	SS	MS	F
Treatment	$k-1$	SSA	$MSA = \frac{SSA}{k-1}$	$F = \frac{MSA}{MSE}$
Error	$n-k$	SSE	$MSE = \frac{SSE}{n-k}$	
Total	$n-1$	SS Total		

Source	d.o.f.	SS	MS	F
Treatment				
Error				
Total				

Draw the Rejection Region on the appropriate curve and label the critical value $(\alpha = .05)$.

Did Pamela have significant evidence that $H_0: \mu_1 = \mu_2 = \mu_3$ is false?

Use both SAS and R to confirm your previous answers (see SAS10 and R10 handouts). The data is in a file named pamela.csv

Fisher's Least Significant Difference = LSD $= t_{n-k,\alpha/2} \cdot \sqrt{MSE} \cdot \sqrt{\dfrac{1}{n_i} + \dfrac{1}{n_j}}$

Find Fisher's LSD for each pair of sample means ($\alpha = .05$). Notice that since the three sample sizes are different, Fisher's LSD will be slightly different for each pair.

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LSD for $\overline{X}_1$ and $\overline{X}_2$:

$\overline{X}_1 - \overline{X}_2 =$

Are $\overline{X}_1$ and $\overline{X}_2$ significantly different?

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LSD for $\overline{X}_1$ and $\overline{X}_3$:

$\overline{X}_1 - \overline{X}_3 =$

Are $\overline{X}_1$ and $\overline{X}_3$ significantly different?

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LSD for $\overline{X}_2$ and $\overline{X}_3$:

$\overline{X}_2 - \overline{X}_3 =$

Are $\overline{X}_2$ and $\overline{X}_3$ significantly different?

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Draw an underline summary for the three sample means and identify which pair(s) of means are significantly different from each other:

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After you have completed this handout, complete the Canvas quiz titled:
<u>Lab 08 – Pamela the Pediatrician</u>