MTH 3240 Lab 8 **Answer Sheet**

Due Thu., Apr. 16

1 Part A

1.1 Flowers Data Set

1. NA
2. Give the values of the sample means:

   Bihai Sample Mean $\bar{Y}_{1\cdot}$ = _____

   Red Sample Mean $\bar{Y}_{2\cdot}$ = _____

   Yellow Sample Mean $\bar{Y}_{3\cdot}$ = _____

3. Give the values of the sample standard deviations:

   Bihai Sample Standard Deviation S_1 = _____

   Red Sample Standard Deviation S_2 = _____

   Yellow Sample Standard Deviation S_3 = _____

4. **Don't print** the boxplots. Just answer the following question.

   Judging from the side-by-side boxplots, which species has the longest flowers? _____

5. The results of your **analysis of variance** are summarized in an ***ANOVA table*** having the form shown below.

   One-Factor ANOVA Table:

Source	DF	SS	MS	F	P-value
Factor	$k-1$	SSTr	MSTr=SSTr/$(k-1)$	F=MSTr/MSE	p
Error	$N-k$	SSE	MSE=SSE/ $(N-k)$		
Total	$N-1$	SSTo			

   From the **ANOVA table** returned by `summary()` in R, give the values of the following:

Treatment Sum of Squares **SST** = _____

Error Sum of Squares **SSE** = _____

Degrees of Freedom for SST **df** = _____

Degrees of Freedom for SSE **df** = _____

Mean Square for Treatments **MST** = _____

Mean Square for Error **MSE** = _____

ANOVA F Test Statistic ***F***= _____

P-value= _____

Using the values of **SST** and **SSE**, compute the value of the **total sum of squares**:

SSTo = **SST** + **SSE** = _____

Based on the results of the **ANOVA *F* test**, is there a ***statistically significant*** **species** effect (i.e. are there significant differences in the mean **flower lengths** for the three **species**) (Yes/No)? _____

2 Part B

2.1 Flowers Data Set (Cont'd)

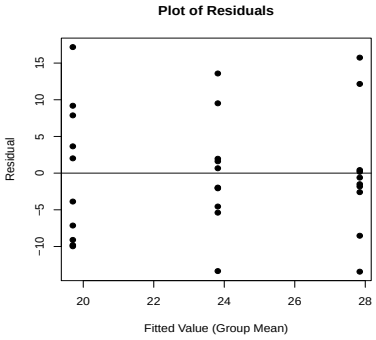
1. **Don't print** the plot. Just answer the following question:

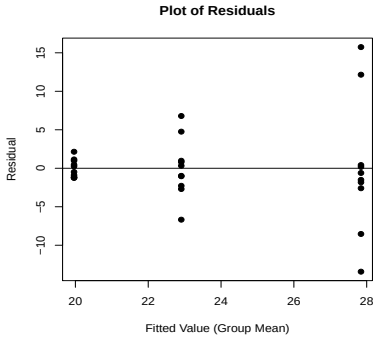
   Does the normality assumption appear to be met?

2. **Don't print** the plot. Just answer the following question:

   Does the equal standard deviation assumption appear to be met?

   Hint: The equal standard deviation assumption is met when the vertical spread of points is about the same from left to right (as in the left plot below), and **not met** when the spread increases from left to right (as in the right plot below).


Plot of Residuals
Residual
Fitted Value (Group Mean)
20
22
24
26
28
−10
−5
0
5
10
15


Plot of Residuals
Residual
Fitted Value (Group Mean)
20
22
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−10
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5
10
15