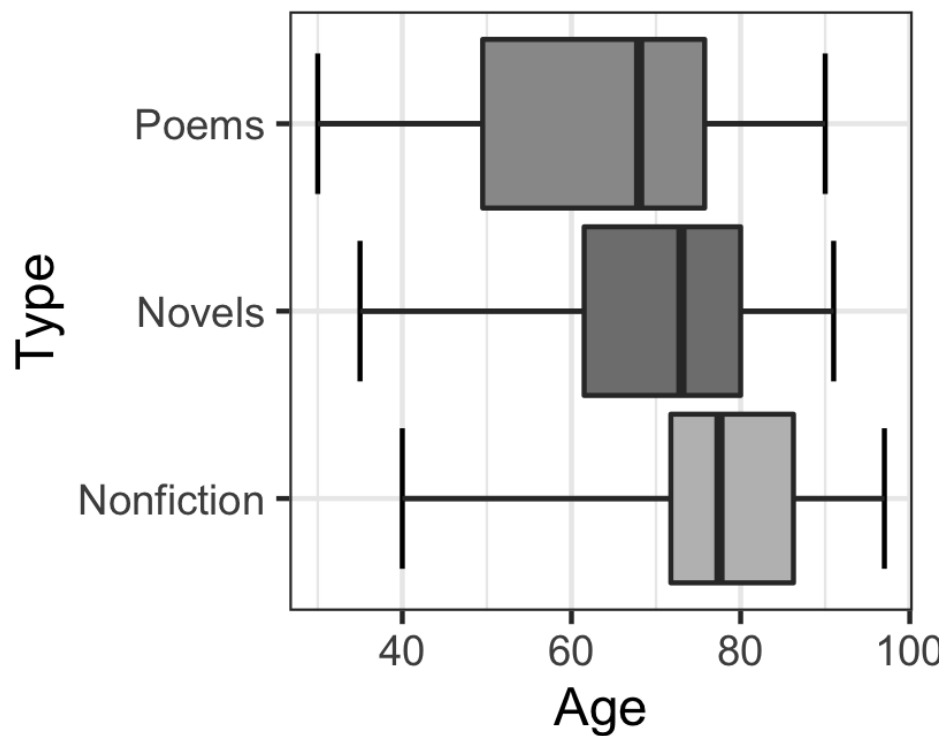# Lesson 14: Inference for Several Means (ANOVA)

Preparation

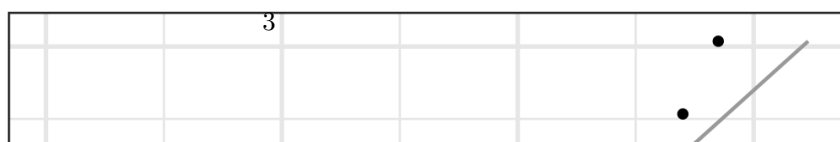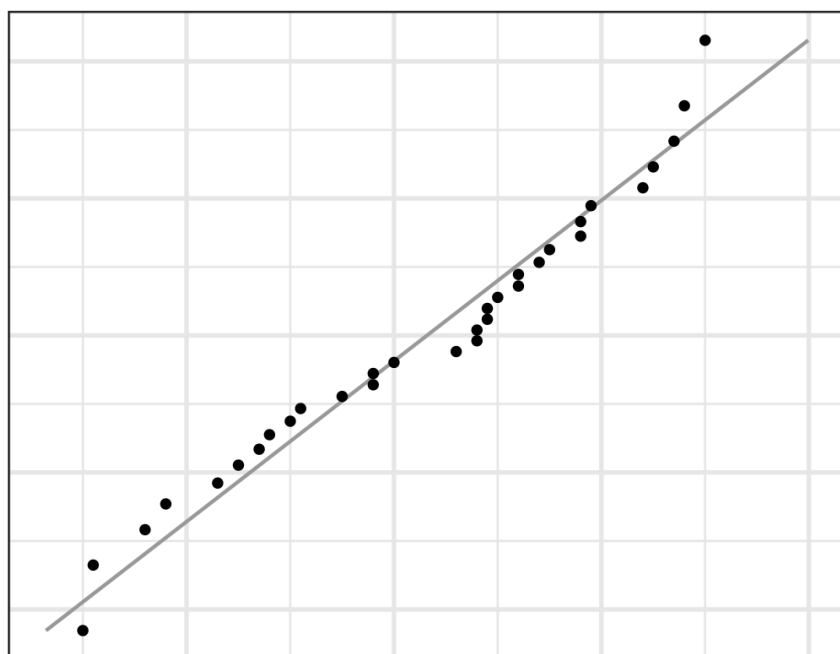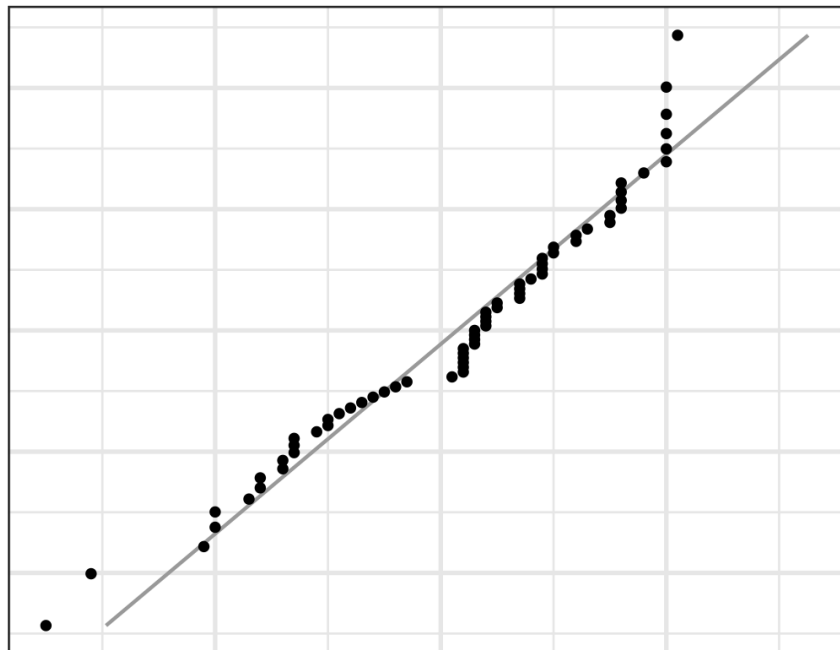**Solutions**

Problem	Part	Solution
1	-	H_o : All the means are equal
		H_a : One or more of the means differs from the others
2	-	The rule is if the largest variance is not four times the smallest variance, then we will conclude that the variances are equal.
3	-	Answers may vary, but should include that we are now dealing with more than 2 means.
4	A	Is the mean age at death different from any of the three categories of writers (novelists, poets, and nonfictions writers).
4	B	H_o : All the means are equal
		H_a : One or more of the means differs from the others
5	-	We do not know exactly how the data was collected, we only know that they looked at the ages at death for female writers in North America.

Problem	Part	Solution
6	-	Students should have a paragraph that includes the following summary statistics.

Novelist: $n = 67$, $\bar{x} = 71.448$, $s = 13.052$
Poets: $n = 32$, $\bar{x} = 63.188$, $s = 17.297$
Nonfiction: $n = 24$, $\bar{x} = 76.875$, $s = 14.097$

They should also include boxplots for each sample as their graphs.

7	A	ANOVA test of several means.

Problem	Part	Solution
7	B	The data are normally distributed for each group: Note that the requirement is not that the sample means are normal, but that the data themselves are normal; so, the large sample size in groups 1 and 2 do not allow us to assume that the normality assumption is met. This means you need to do a qq-plot for each of the groups. The qq-plots show that the groups are not perfectly normal, but they are probably close enough to proceed with ANOVA.

Problem	Part	Solution
7	C	F statistic $= 6.563$
7	D	$df = 2, 120$
7	E	P-value $= 0.002 < 0.05$
7	F	We reject the null hypothesis
7	G	We have sufficient evidence to say that at least one of the mean ages of death of writers is different from the rest of the mean death ages for the other categories of writers.
8		Answers may vary