

Chapter 24

3. Gas mileage A student runs an experiment to study the effect of three different mufflers on gas mileage. They devise a system so that their Jeep Wagoneer uses gasoline from a one-liter container. They test each muffler 8 times, carefully recording the number of miles they can go in their Jeep Wagoneer on one liter of gas. After analyzing the data, they report that the F -ratio is 2.35 with a P-value of 0.1199.

- What are the null and alternative hypotheses?
- How many degrees of freedom does the treatment sum of squares have? How about the error sum of squares?
- What would you conclude?
- What else about the data would you like to see in order to check the assumptions and conditions?
- If your conclusion in part c is wrong, what type of error have you made?

17. School system A school district superintendent wants to test a new method of teaching arithmetic in the fourth grade at 15 schools. They plan to select 8 students from each school to take part in the experiment, but to make sure they are roughly of the same ability, they first give a test to all 120 students.

[MINITAB EXPRESS!]

- What are the null and alternative hypotheses?
- What does the ANOVA table say about the null hypothesis? (Be sure to report this in terms of scores and schools.)
- An intern reports that they have done t -tests of every school against every other school and finds that several of the schools seem to differ in mean score. Does this match your finding in part b? Give an explanation for the difference, if any, of the two results.

9. Tellers A bank is studying the time that it takes 6 of its tellers to serve an average customer. Customers line up in the queue and then go to the next available teller.

[MINITAB EXPRESS!]

- What are the null and alternative hypotheses?
- What do you conclude?

7. Fuel economy Boxplots are needed to show the relationship between the number of cylinders a car's engine has and the car's fuel economy.

[MINITAB EXPRESS!]

- a) State the null and alternative hypotheses that you might consider for these data.
- b) Do the conditions for an ANOVA seem to be met here? Why or why not?

15. Eggs A student wants to investigate the effects of real vs. substitute eggs on their favorite brownie recipe. They enlist the help of 10 friends and asks them to rank each of 8 batches on a scale from 1 to 10. Four of the batches were made with real eggs, four with substitute eggs. The judges tasted the brownies in random order.

[MINITAB EXPRESS!]

- a) What are the null and alternative hypotheses?
- b) What do you conclude from the ANOVA table?
- c) Do the assumptions for the test seem to be reasonable?
- d) Perform a two-sample pooled t -test of the difference. What P-value do you get?

(Need to click "Assume equal variances" button and choose H_A of \neq .)