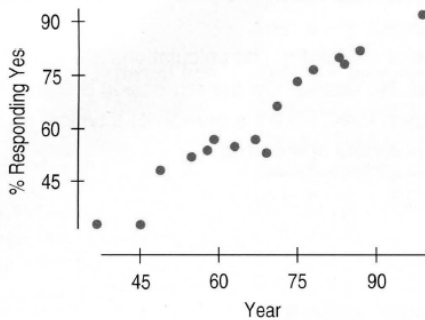


1. **Ms. President?** In Chapter 7 we saw data collected by the Gallup organization. They have, over six decades, periodically asked the following question:

If your party nominated a generally well-qualified person for president who happened to be a woman, would you vote for that person?

Here is a scatterplot of the percentage answering "yes" vs. the year of the century (37 = 1937):



In Chapter 7 we could describe the relationship only in general terms. Now we can learn more. Here is the regression analysis:

Dependent variable is: Yes

R-squared = 94.2%

s = 4.274 with 16 - 2 = 14 degrees of freedom

Variable	Coefficient	SE(Coeff)	t-ratio	P-value
Intercept	-5.58269	4.582	-1.22	0.2432
Year	0.999373	0.0661	15.1	<0.0001

- Explain in words and numbers what the regression says.
- State the hypothesis about the slope (both numerically and in words) that describes how voters' thoughts have changed about voting for a woman.
- Assuming that the assumptions for inference are satisfied, perform the hypothesis test and state your conclusion. Be sure to state it in terms of voters' opinions.
- Explain what the R-squared in this regression means.

3. **No opinion.** Here's a regression of the percentage of respondents whose response to the question about voting for a woman president was "no opinion." We wonder if the percentage of the public who have no opinion on this issue has changed over the years. Assume that the conditions for inference are satisfied.

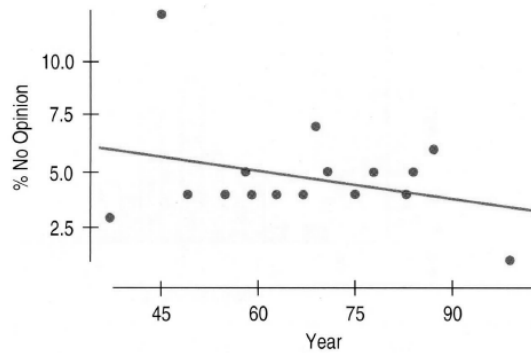
Dependent variable is: No Opinion

R-squared = 9.5%

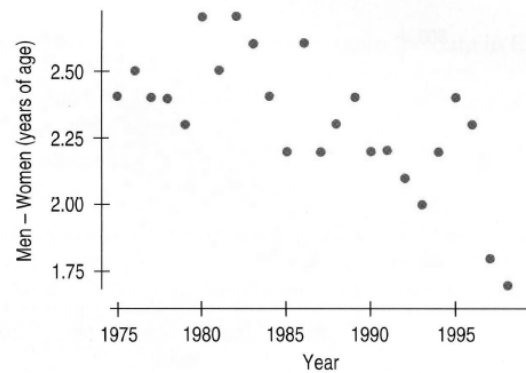
s = 2.280 with 16 - 2 = 14 degrees of freedom

Variable	Coefficient	SE(Coeff)	t-ratio	P-value
Intercept	7.69262	2.445	3.15	0.0071
Year	-0.042708	0.0353	-1.21	0.2458

- State the appropriate hypothesis for the slope.
- Test your hypothesis and state your conclusion in the proper context.
- On the next page is the scatterplot corresponding to the regression for No Opinion. How does the scatterplot change your opinion of the trend in "no opinion" responses? Do you think the true slope is negative? Does this change the conclusion of your hypothesis test of part b? Explain.



5. **Marriage age.** The scatterplot suggests a decrease in the difference in ages at first marriage for men and women since 1975. We want to examine the regression to see if this decrease is significant.



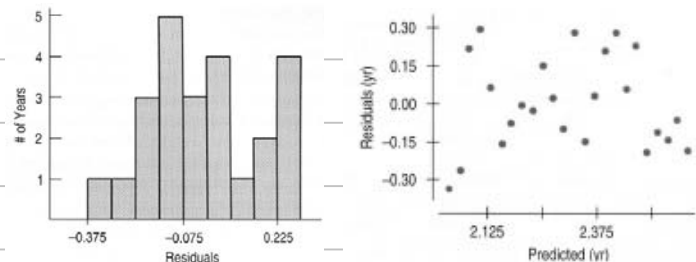
Dependent variable is: Men - Women

R-squared = 46.3%

s = 0.1866 with 24 - 2 = 22 degrees of freedom

Variable	Coefficient	SE(Coeff)	t-ratio	P-value
Intercept	49.9021	10.93	4.56	0.0002
Year	-0.023957	0.0055	-4.35	0.0003

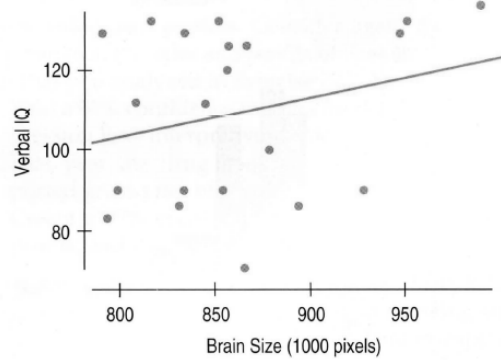
- Write appropriate hypotheses.
- Here are the residuals plot and a histogram of the residuals. Do you think the conditions for inference are satisfied? Explain.



- Test the hypothesis and state your conclusion about the trend in age at first marriage.

7. **Marriage age, again.** Based on the analysis of marriage ages since 1975 given in Exercise 5, give a 95% confidence interval for the rate at which the age gap is closing. Clearly explain what your confidence interval means.

16. **Brain size.** Does your IQ depend on the size of your brain? A group of female college students took a test that measured their verbal IQs and also underwent an MRI scan to measure the size of their brains (in 1000s of pixels). The scatterplot and regression analysis are shown, and the assumptions for inference were satisfied.



Dependent variable is: IQ_Verbal
R-squared = 6.5%

Variable	Coefficient	SE(Coeff)
Intercept	24.1835	76.38
Size	0.098842	0.0884

- Test an appropriate hypothesis about the association between brain size and IQ.
- State your conclusion about the strength of this association.

26. **Crawling.** Researchers at the University of Denver Infant Study Center wondered if temperature might influence the age at which babies learn to crawl. Perhaps the extra clothing that babies wear in cold weather would restrict movement and delay the age at which they started crawling. Data were collected on 208 boys and 206 girls. Parents reported the month of the baby's birth and the age (in weeks) at which their child first crawled. The table gives the average *temperature* (°F) when the babies were 6 months old and average *crawling age* (in weeks) for each month of the year. Make the plots and compute the analyses necessary to answer the following questions.

Birth Month	6-Month Temperature	Average Crawling Age
Jan.	66	29.84
Feb.	73	30.52
Mar.	72	29.70
April	63	31.84
May	52	28.58
June	39	31.44
July	33	33.64
Aug.	30	32.82
Sept.	33	33.83
Oct.	37	33.35
Nov.	48	33.38
Dec.	57	32.32

- Would this association appear to be weaker, stronger, or the same if data had been plotted for individual babies instead of using monthly averages? Explain.
- Is there evidence of an association between *temperature* and *crawling age*? Test an appropriate hypothesis and state your conclusion. Don't forget to check the assumptions.
- Create and interpret a 95% confidence interval for the slope of the true relationship.

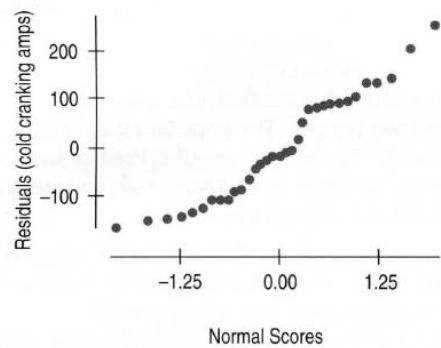
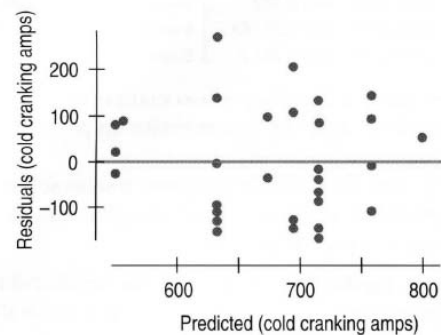
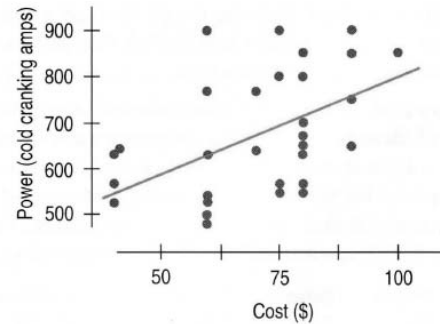
25. **Start the car!** In October 2002, *Consumer Reports* listed the price (in dollars) and power (in cold cranking amps) of auto batteries. We want to know if more expensive batteries are generally better in terms of starting power. Here are several software displays.

Dependent variable is: Power

R-squared = 25.2%

s = 116.0 with 33 - 2 = 31 degrees of freedom

Variable	Coefficient	SE(Coeff)	t-ratio	P-value
Intercept	384.594	93.55	4.11	0.0003
Cost	4.14649	1.282	3.23	0.0029



- How many batteries were tested?
- Are the conditions for inference satisfied? Explain.
- Is there evidence of an association between the cost and cranking power of auto batteries? Test an appropriate hypothesis and state your conclusion.
- Is the association strong? Explain.
- What is the equation of the regression line?
- Create a 90% confidence interval for the slope of the true line.
- Interpret your interval in this context.