

Chapter 4

A review of voter registration records in a small town yielded the following table of the number of males and females registered as Democrat, Republican, or some other affiliation.

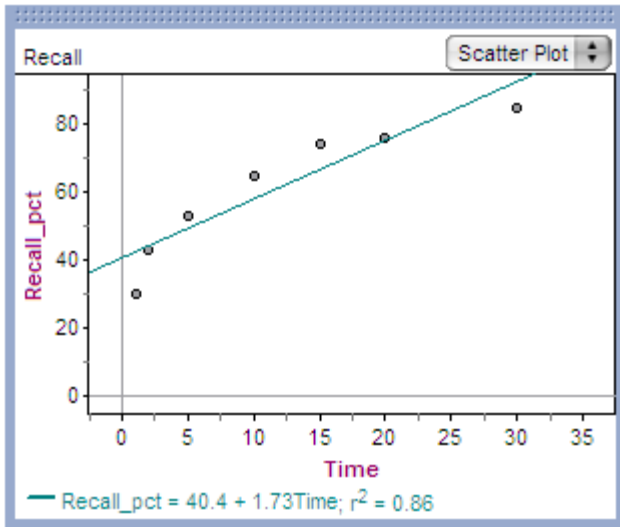
| | Male | Female |
|------------|------|--------|
| Democrat | 300 | 600 |
| Republican | 500 | 300 |
| Other | 200 | 100 |

- The proportion of males that are registered as Democrats is
 (a) 300. (b) 0.33. (c) 0.30. (d) 0.15. (e) 0.375.
- The proportion of all voters who are male and registered as Democrats is
 (a) 300. (b) 0.33. (c) 0.30. (d) 0.15. (e) 0.375.
- A company decided to expand, so it opened a new factory with 455 available jobs. The following tables summarize the hiring decisions made by the company.

| | Workers | | | Managers | |
|---------|---------|--------|---------|----------|--------|
| | Male | Female | | Male | Female |
| Applied | 400 | 100 | Applied | 200 | 200 |
| Hired | 300 | 85 | Hired | 30 | 40 |

- Calculate the percent of male and female workers that are hired. Then do likewise for male and female managers.
- Use the tables above to create a two-way table that shows the relationship between gender and hiring decision.
- Calculate the percent of male and female applicants that were hired.
- Explain your findings in (a) and (c).

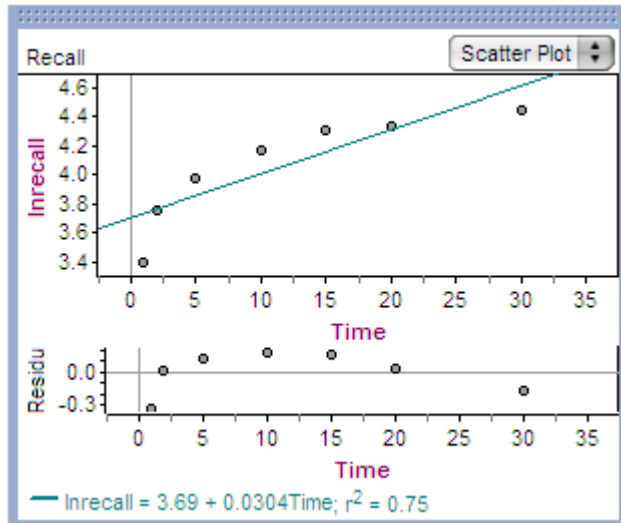
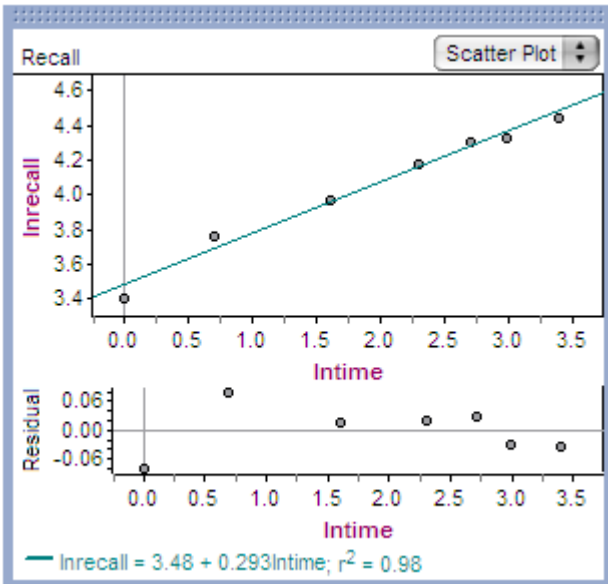
4. An experiment was conducted to determine the effect of practice time (in seconds) on the percent of unfamiliar words recalled. Here is a Fathom scatterplot of the results with a least-squares regression line superimposed.



(a) Sketch a residual plot below.

(b) Does a linear model fit the data well? Justify your answer.

We used Fathom to transform the original data in hopes of achieving linearity. The screen shots below show the results of two different transformations.



(c) Would an exponential model or a power model fit the original data better? Justify your answer.

(d) Use the model you chose in (c) to predict word recall for 25 seconds of practice. Show your method.

1. The following numbers appear in a table of random digits:

38683 50279 38224 09844 13578 28251 12708 24684

A scientist will be measuring the total amount of woody debris in a random sample ($n = 5$) of sites selected without replacement from a population of 45 sites. The sites are labeled 01, 02, . . . , 45 and she starts at the beginning of the line of random digits and takes consecutive pairs of digits. Which of the following is correct?

- (a) Her sample is 38, 25, 02, 38, 22
 (b) Her sample is 38, 68, 35, 02, 22
 (c) Her sample is 38, 35, 27, 28, 08
 (d) Her sample is 38, 65, 35, 02, 79
 (e) Her sample is 38, 35, 02, 22, 40
2. A committee on community relations in a college town plans to survey local businesses about the importance of students as customers. From telephone book listings, the committee chooses 150 businesses at random. Of these, 73 return the questionnaire mailed by the committee. The population for this study is
- (a) all businesses in the college town.
 (b) all businesses.
 (c) the 150 businesses chosen.
 (d) the 73 businesses that returned the questionnaire.
 (e) the committee on community relations.
3. An experimenter wishes to test whether or not two types of fish food (a standard fish food and a new product) work equally well at producing fish of equal weight after a 2-month feeding program. The experimenter has 2 identical fish tanks (1 and 2) to put fish in and is considering how to assign the 40 tagged fish to the tanks. To properly assign the fish, one step would be to
- (a) put all the odd tagged numbered fish in one tank, the even in the other, and give the standard food type to the odd numbered ones.
 (b) obtain pairs of fish whose weights are virtually equal at the start of the experiment and randomly assign one to tank 1 and the other to tank 2, with the feed assigned at random to the tanks.
 (c) proceed as in (b), but put the heavier of the pair into tank 2.
 (d) assign the fish at random to the two tanks and give the standard feed to tank 1.
 (e) not proceed as in (b) because using the initial weight in (b) is a nonrandom process. Use the initial length of the fish instead.
4. Do you trust the Internet? You want to ask a sample of college students the question “How much do you trust information about health that you find on the Internet—a great deal, somewhat, not much, or not at all?” You try out this and other questions on a pilot group of 10 students chosen from your class. The class members are

| | | | | |
|----------|-----------|---------|-----------|----------|
| Anderson | Deng | Glaus | Nguyen | Samuels |
| Arroyo | De Ramos | Helling | Palmiero | Shen |
| Batista | Drasin | Husain | Percival | Tse |
| Bell | Eckstein | Johnson | Prince | Velasco |
| Burke | Fernandez | Kim | Puri | Wallace |
| Cabrera | Fullmer | Molina | Richards | Washburn |
| Calloway | Garcia | Morgan | Rider | Zabidi |
| Delluci | Gandhi | Murphy | Rodriguez | Zhao |

Choose an SRS of 10 students. Use Table B, shown below, beginning at line **117**. Explain your method clearly.

| | | | | | | | | |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|
| 117 | 38167 | 98532 | 62183 | 70632 | 23417 | 26185 | 41448 | 75532 |
| 118 | 73190 | 32533 | 04470 | 29669 | 84407 | 90785 | 65956 | 86382 |
| 119 | 95857 | 07118 | 87664 | 92099 | 58806 | 66979 | 98624 | 84826 |
| 120 | 35476 | 55972 | 39421 | 65850 | 04266 | 35435 | 43742 | 11937 |

5. Does ginkgo improve memory? The law allows marketers of herbs and other natural substances to make health claims that are not supported by evidence. Brands of ginkgo extract claim to “improve memory and concentration.” A randomized comparative experiment found no evidence for such effects. The subjects were 230 healthy people over 60 years old. They were randomly assigned to ginkgo or a placebo pill (a dummy pill that looks and tastes the same). All the subjects took a battery of tests for learning and memory before treatment started and again after six weeks.

(a) What are the explanatory and response variables in this experiment?

(b) Outline the design of this experiment.

(c) The study was double-blind. What does this mean?

(d) Use Table B, starting at line **103** (below), and choose only the first 5 members of the ginkgo group.

| | | | | | | | | |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|
| 103 | 45467 | 71709 | 77558 | 00095 | 32863 | 29485 | 82226 | 90056 |
| 104 | 52711 | 38889 | 93074 | 60227 | 40011 | 85848 | 48767 | 52573 |
| 105 | 95592 | 94007 | 69971 | 91481 | 60779 | 53791 | 17297 | 59335 |
| 106 | 68417 | 35013 | 15529 | 72765 | 85089 | 57067 | 50211 | 47487 |

Chapter 6

Here is the probability model for the blood type of a randomly chosen person in the United States:

| | | | | |
|-------------|------|------|------|----|
| Blood type | O | A | B | AB |
| Probability | 0.45 | 0.40 | 0.11 | ? |

Questions 1, 2, and 3 use this information.

1. The probability that a randomly chosen American has type AB blood must be
 - (a) any number between 0 and 1.
 - (b) 0.45.
 - (c) 0.4.
 - (d) 0.96.
 - (e) 0.04.
2. Maria has type B blood. She can safely receive blood transfusions from people with blood types O and B. What is the probability that a randomly chosen American can donate blood to Maria?
 - (a) 0.11
 - (b) 0.44
 - (c) 0.45
 - (d) 0.51
 - (e) 0.56
3. What is the probability that a randomly chosen American does not have type O blood?
 - (a) 0.04
 - (b) 0.11
 - (c) 0.45
 - (d) 0.55
 - (e) 0.51
4. An instant lottery game gives you probability 0.02 of winning on any one play. Plays are independent of each other. If you play 3 times, the probability that you win on *none* of your plays is about
 - (a) 0.98.
 - (b) 0.94.
 - (c) 0.000008.
 - (d) 0.06.
 - (e) 0.96.
5. The probability that you win on *one or more* of your 3 plays of the game in the previous question is about
 - (a) 0.06.
 - (b) 0.02.
 - (c) 0.999992.
 - (d) 0.04.
 - (e) 0.98.
6. Of people who died in the United States in a recent year, 86% were white, 12% were black, and 2% were Asian. (This ignores a small number of deaths among other races.) Diabetes caused 2.8% of deaths among whites, 4.4% among blacks, and 3.5% among Asians. The probability that a randomly chosen death is a white who died of diabetes is about
 - (a) 0.107.
 - (b) 0.030.
 - (c) 0.024.
 - (d) 0.86.
 - (e) 0.03784.
7. Using the information in the previous question, the probability that a randomly chosen death was due to diabetes is about
 - (a) 0.107.
 - (b) 0.038.
 - (c) 0.024.
 - (d) 0.96.

(e) 0.030.

8. Suppose you are given a standard six-sided die and told that the die is “loaded” in such a way that while the numbers 1, 3, 4, and 6 are equally likely to turn up, the numbers 2 and 5 are three times as likely to turn up as any of the other numbers.

(a) The die is rolled once and the number turning up is observed. Use the information given above to fill in the following table:

| | | | | | | |
|----------------|----------|----------|----------|----------|----------|----------|
| <u>Outcome</u> | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> |
| Probability | | | | | | |

(b) Let A be the event: the number rolled is a prime number (a number is prime if its only factors are 1 and the number itself; note that 1 is not prime). List the outcomes in A and find $P(A)$.

(c) Let B be the event: the number rolled is an even number. List the outcomes in B and find $P(B)$.

(d) Are events A and B disjoint? Explain briefly.

(e) Determine if events A and B are independent.