

Using the lines from the random digital table below, answer the following questions.

34543 | 60988 | 07740 | 81422 | 09275 | 09837 | 02720 | 32854 | 87433 | 46209 | 20928 | 72264 | 59836

1) Katie has to choose 5 students from a group of 30. Which of the 30 students will be selected?

09, 07, 08, 14, 22

3) In a game of chance, there is a 15% chance you will win \$10, and an 85% chance you will lose \$2. What is the expected value of the game?

$$0.15(10) + 0.85(-2) = \$ -0.20$$

2) A tutoring company has a bank of 280 tutors they randomly assign to schools. If 3 schools need two tutors each, which tutors will be selected?

345 | 436 | 098 | 307 | 730 | 814 | 220 | 927 | 509 | 837 |
 027 | 203 | 285 | 487 | 433 | 462 | 092 | 092 | 872 | 264

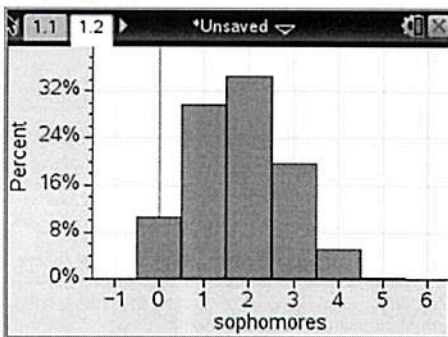
→ 6 tutors

4) Roll one die. If you get a number less than 3, you win 25 points, otherwise, you lose 50 points. What is the expected value of the game?

Less than 3 $\Rightarrow \frac{2}{6} = \frac{1}{3}$

$$\frac{2}{6}(25) + \frac{4}{6}(-50) = -25 \text{ pts.}$$

5) Five people are selected at random to form a committee that decides on school policies. There are 5 juniors, and 5 sophomores in the group. The histogram displays the data for 1000 simulations of the section process and recording the number of sophomores in the group.



a) If 5 sophomores were selected for the committee, would you have reason to doubt the random selection of students?

Yes, in our simulation, 5 soph. were selected less than 1% of the time

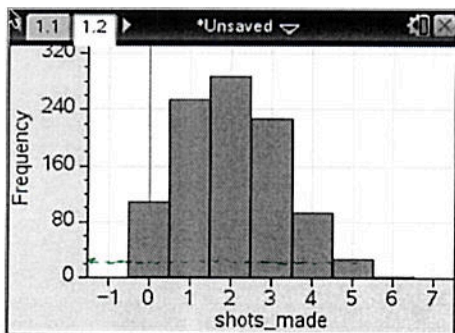
b) How many sophomores were you most likely to select?

2 was most common

c) How often were 4 sophomores selected? Would you have reason to doubt the randomness of the procedure if 4 sophomores were selected?

About 5% of time. It would be unusual, but not impossible. It would happen under random selection.

6) You and your friend are shooting 3 point shots on a basketball court. Your friend claims that she makes 3 point shots about half the time. She shoots 10 three-point shots each day after school. The following is a histogram of 1000 repetitions of shooting 10 three point shots, recording the number of shots she made.



a. Do you have reason to believe that your friend routinely makes half of her three point shots (out of 10 shots)?

No, she only made 5 out of 10 shots about 20 times out of 1000, or 2% of time

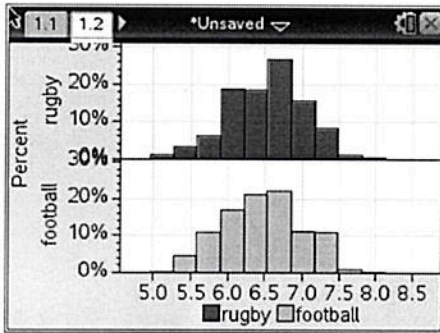
b. How many shots did she usually make?

She usually only made 2 shots

c. How often did she not make any shots? Make all of her shots?

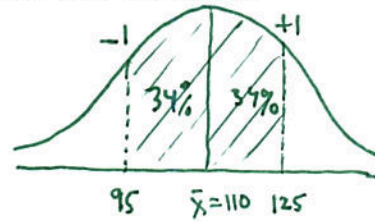
She didn't make any shots 110 times out of 1000 (11%). She never made all of her shots.

7) Times for running the mile were recorded for player's on the school's rugby and football teams. The histograms below show the distribution of each sport's times. Do the mile times for each sport appear to come from the same distribution? Explain why or why not, comparing the shape, center, and spread of the distribution.



They appear to come from same distributions. Both distributions are symmetric, both have a center of about 6.5 to 7 min and both have a spread of about 5 min to 8 min.

8) Birth weights at a local hospital have a normal distribution with a mean of 110 ounces and a standard deviation of 15 ounces. About how many infants out of 200 are born between 95 and 125 ounces?



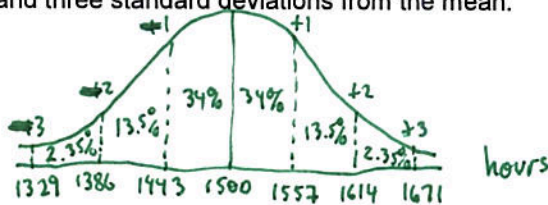
$$34 + 34 = 68\%$$

About how many infants born between 95 and 125 ounces out of 200?

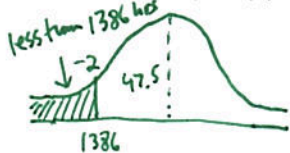
$$0.68 \cdot 200 = 136 \text{ infants}$$

9) A 60 watt light bulb is normally distributed and has a mean lifetime of 1500 hours with a standard deviation of 57 hours.

a. Sketch the distribution of bulb life. Label the points one, two, and three standard deviations from the mean.



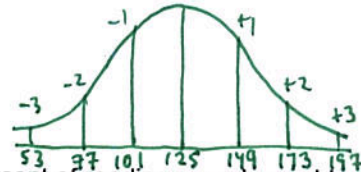
b. What percent of light bulbs would you expect to last less than 1386 hours? Shade that part of the distribution sketched in part (a).



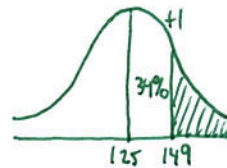
$$50 - 47.5 = 2.5\%$$

10) The reading speed of sixth-grade students is approximately normal, with a mean speed of 125 words per minute with a standard deviation of 24 words per minute.

a. Sketch the distribution of reading times. Label the points one, two, and three standard deviations from the mean.



b. What percent of reading speeds would you expect to be greater than 149 words per minute? Shade that part of the distribution sketched in part (a).



$$50 - 34 = 16\%$$

11) The following data represent the number of chips found in a popular brand of chocolate chip cookies.

11	9	11	11	7
10	13	13	10	7

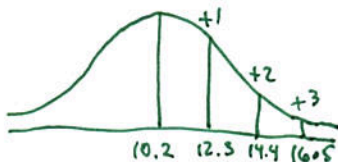
a. Does the data seem to follow a normal distribution? Explain your reasoning.

Yes, the normal probability plot is roughly linear

b. What are the mean and standard deviation of the data?

$$\bar{x} = 10.2, s = 2.10; \text{ Use nspire}$$

c. Would a cookie with 15 chips be considered an outlier? Explain your reasoning.



No, b/c its not more than 3 std. dev. from the mean.

12) The following data represent the length of time it takes to complete an oil change at Speed Lube.

19.1	15.6	17.4	18.3	21.7
14.8	19.1	18.3	17.6	13.8

a. Does the data seem to follow a normal distribution? Explain your reasoning.

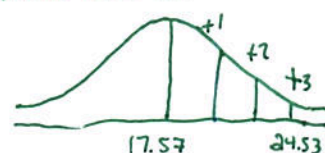
Yes, the normal prob. plot is roughly linear

b. What are the mean and standard deviation of the data?

$$\bar{x} = 17.57, s = 2.32; \text{ Use nspire}$$

c. Would an oil change that took 25 minutes be considered an outlier? Explain your reasoning.

Yes, since its more than 3 std. deviations from mean.



13) The following data are the speed (miles per hour) of 20 cars traveling through a school zone. → n = 20

20	25	23	23	28	27	22	26	28	23
24	23	20	24	21	28	24	25	23	25

a. What is the mean and standard deviation of the data

$$\bar{x} = 24.1, s = 2.4473$$

b. At a 95% confidence level, what is the approximate margin of error?

$$M.E. = 1.96 \cdot \frac{2.4473}{\sqrt{20}} = 1.07$$

$$M.E. = 1.96 \cdot \frac{s}{\sqrt{n}}$$

c. What is the confidence interval for a 95% confidence level?

$$\begin{aligned} \bar{x} \pm M.E. & \quad 24.1 + 1.07 = 25.17 \\ & \quad 24.1 - 1.07 = 23.03 \quad \therefore [23.03, 25.17] \end{aligned}$$

d. What is the meaning of the interval in terms of speed of cars in the school zone?

We are 95% confident that the true mean speed of cars in the school zone is between 23.03 and 25.17 mph.

14) The following data are the drive through wait times (seconds) for 20 customers at Wendy's.

88	131	132	169	115	125	133	151	129	148
163	142	146	160	87	156	149	134	148	170

a. What is the mean and standard deviation of the data

$$\bar{x} = 138.8, s = 22.92$$

b. At a 95% confidence level, what is the approximate margin of error?

$$M.E. = 1.96 \cdot \frac{22.92}{\sqrt{20}} = 10.05$$

c. What is the confidence interval for a 95% confidence level?

$$\begin{aligned} 138.8 + 10.05 & = 148.85 \\ 138.8 - 10.05 & = 128.75 \quad \therefore [128.75, 148.85] \end{aligned}$$

d. What is the meaning of the interval in terms drive through wait times?

We are 95% confident that the true mean drive through wait time at Wendy's is between 128.75 and 148.85 seconds.

15) A random sample of 500 adults was taken, and each adult was asked if they approved or disapproved of the President's current job in office. 235 adults said they approved of the job the president was doing.

a. Determine this result's margin of error for a 95% confidence interval.

$$\hat{p} = \frac{235}{500} = 0.47$$

$$M.E. = 1.96 \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 1.96 \sqrt{\frac{0.47 \cdot 0.53}{500}} = 0.0437$$

b. What is the confidence interval for a 95% confidence level?

$$\hat{p} \pm M.E.$$

$$0.47 + 0.0437 = 0.5137$$

$$0.47 - 0.0437 = 0.4263$$

$$\therefore [0.4263, 0.5137]$$

c. What is the meaning of the 95% confidence interval?

We are 95% confident that the true proportion of adults who support Obama is between 42.6% and 51.4%.

16) A random sample of 1500 students was taken, and it was found that 28% of the students generally liked the cafeteria food at the school.

a. Determine this result's margin of error for a 95% confidence interval.

$$\hat{p} = 0.28$$

$$M.E. = 1.96 \sqrt{\frac{0.28(1-0.28)}{1500}} = 0.02272$$

b. What is the confidence interval for a 95% confidence level?

$$0.28 + 0.02272 = 0.30272$$

$$0.28 - 0.02272 = 0.25728 \therefore [0.2573, 0.3027]$$

c. What is the meaning of the 95% confidence interval?

We are 95% confident that the true prop. of students who like the cafeteria food is between 25.7% and 30.3%.