

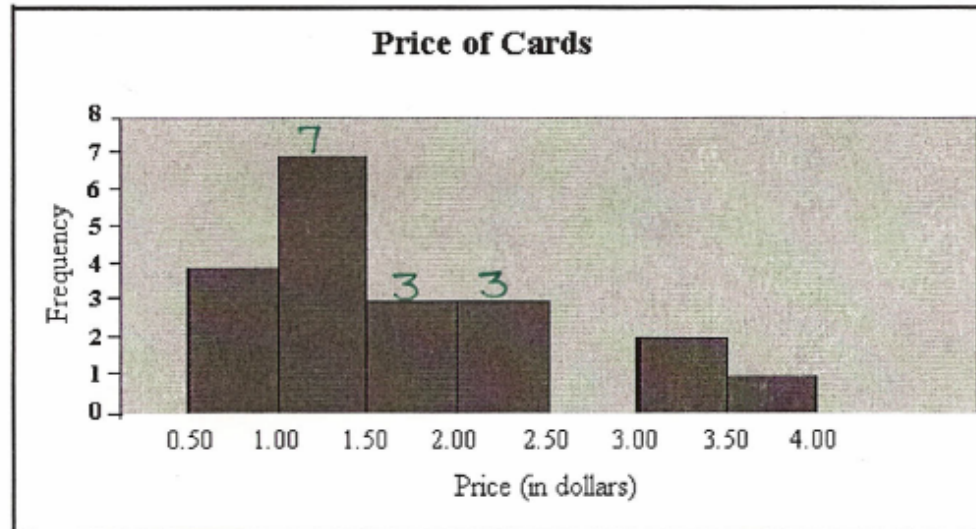
Statistics Review

1. The owner of a local shoe shop recorded the sizes of the feet of all customers who purchased shoes on a particular morning. Below is a list of these sizes:

8 7 8 9 6 5 8 6 9 10 9 5 7 11 8 9 7 7 10 5

- a) Calculate the mean. $\text{mean}(\mu) = \frac{154}{20}$
 $= 7.7$
- b) Calculate the median. $\text{median} = \frac{8+8}{2}$
 $= \frac{16}{2}$
 $= 8$
- c) Calculate the mode.
Mode 7, 8, 9

2. A cashier at a local discount store recorded the price of each card that was purchased by customers on a particular day. Following is a relative frequency histogram displaying this data.



Approximately how many people purchased a card valued between \$1.00 and \$2.50?

$$7 + 3 + 3 = 13 \text{ cards}$$

3. Identify the type of sampling that was used in each instance below.

- a) The Home and School Association wanted to ask parents of students a series of questions. They sent representatives to all schools in District 16 and directed them to ask every 5th parent that attended Parent-Teacher Interviews. First, each representative had to randomly select which parent to approach and then approach every 5th parent after their initial selection. *Systematic Sample*
- b) Mr. LaBerge wanted to know what percentage of the school population completed more than 2 hours of homework each night. He stood at the entrance of the school and as a student approached the doors, he drew a number from 1-10 out of a hat. If the number 2 was drawn, the student had to complete a homework questionnaire. *Simple Random Sample*
- c) School District 16 wants to know if students support its decision to make the entire district a scent-free environment. A random sample was selected in such a manner to ensure that a proportional number of students from each school in the district were selected. *Stratified Random Sample*
- d) Danielle wants to know what percentage of skiers support the mandatory use of helmets. She went to her local ski hill where she approached individuals and asked them to complete a questionnaire on the subject. *Convenience Sample*
- e) The New York Times wanted to know the average height of players in the NBA. The sports editor of the newspaper randomly selected one of the basketball teams and asked every player on that team to get measured. *Clustered Sample*

4. Mr. MacDonald randomly *selected* eight Physics 112 test scores to examine.

65 69 74 79 83 86 92 96

a) Calculate the mean. $\bar{x} = \frac{644}{8}$ *Use appropriate symbol
 $\bar{x} = 80.5$

b) Calculate the standard deviation (Be Careful!).

$$\bar{x} = 80.5$$

| MARKS | DIFFERENCE FROM MEAN | SQUARE OF DIFFERENCES |
|--------------|-----------------------------|------------------------------|
| 65 | -15.5 | 240.25 |
| 69 | -11.5 | 132.25 |
| 74 | -6.5 | 42.25 |
| 79 | -1.5 | 2.25 |
| 83 | 2.5 | 6.25 |
| 86 | 5.5 | 30.25 |
| 92 | 11.5 | 132.25 |
| 96 | 15.5 | 240.25 |
| | | 826 |

$$\begin{aligned} \text{Standard Deviation} &= \sqrt{\frac{826}{7}} \\ (S_x) &= \sqrt{118} \\ &= 10.86 \end{aligned}$$

5. The quality controller at a pharmaceutical company finds that the mean number of vitamin pills in a bottle is 100 with a standard deviation of 1. Assuming a normal distribution,

a) what percent of the bottles contain more than 101 pills?

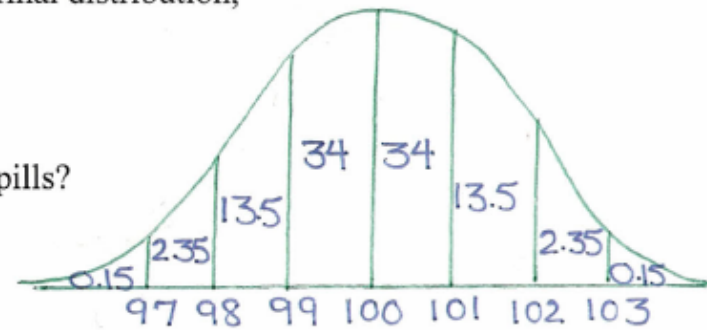
$$13.5 + 2.35 + 0.15 = 16\%$$

b) what percent of the bottles contain between 98 and 102 pills?

$$13.5 + 34 + 34 + 13.5 = 95\%$$

c) what percent of the bottles contain less than 99 pills?

$$13.5 + 2.35 + 0.15 = 16\%$$



6. Sketch a normal distribution graph with a population mean of 35 and a population standard deviation of 5 to answer the following:

a) What percentage of the data would measure between 25 and 45?

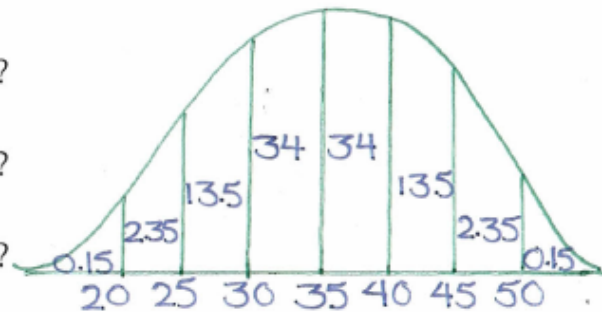
$$13.5 + 34 + 34 + 13.5 = 95\%$$

b) What percentage of the data would measure between 35 and 40?

$$34\%$$

c) What percentage of the data would measure between 30 and 45?

$$34 + 34 + 13.5 = 81.5\%$$



7. What are the mean and the standard deviation of the sampling distribution if random samples of size 64 are selected from a population with $\mu = 475$ and $\sigma = 24$?

Mean of Sampling Dist. →

$$\mu_{\bar{x}} = \mu$$

$$\mu_{\bar{x}} = 475$$

S.D. of Sampling Dist. →

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

$$= \frac{24}{\sqrt{64}}$$

$$= \frac{24}{8} = 3$$

8. A random sample of size 64 is to be selected from a population with $\mu = 692$ and $\sigma = 14$. Suppose that several samples of the same size are repeatedly collected during randomly picked years.

a) What is the population mean?

$$\mu = 692 \text{ (Given)}$$

b) What is the mean of the sampling distribution?

$$\mu_{\bar{x}} = \mu$$

$$\mu_{\bar{x}} = 692$$

c) What is the standard deviation of the sampling distribution?

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

$$= \frac{14}{\sqrt{64}}$$

$$= \frac{14}{8} = 1.75$$

d) Suppose one of the samples of 64 were found to have a sample mean of 702, develop a 95 % confidence interval for this sample and interpret the interval.

* The method used to produce the interval from 698.57 to 705.43 has a 0.95 probability (95% chance) of producing a confidence interval that will enclose the population mean (692).

$$\bar{x} \pm 1.96 \frac{\sigma}{\sqrt{n}}$$

$$702 \pm 1.96 \left(\frac{14}{\sqrt{64}} \right)$$

$$702 \pm 1.96 (1.75)$$

$$702 \pm 3.43$$

$$\left. \begin{array}{l} 702 - 3.43 \\ 702 + 3.43 \end{array} \right\} \begin{array}{l} 698.57 \\ +0 \\ 705.43 \end{array}$$