(6 points) Find the mean, median, and mode of the data set.

1. The prices of cordless phones in a store: $35, 50, 60, 60, 75, 65, 80$

   $35, 50, 60, 60, 65, 75, 80$

   Mean: $\frac{35+50+60+60+65+75+80}{7} = \frac{425}{7} = 60.7$

   Median: 60

   Mode: 60

2. The numbers of homeruns for batters who hit the most homeruns in the 2005 MLB regular season: $51, 48, 47, 46, 45, 43, 41, 40, 40, 39$

   $39, 40, 40, 41, 43, 45, 46, 47, 48, 51$

   Mean: $\frac{39+40+40+41+43+45+46+47+48+51}{10} = \frac{440}{10} = 44$

   Median: 44

   Mode: 40

(11 points) Identify the outlier in the data set. Then find the mean, median, mode, range, and standard deviation of the data set when the outlier is included and when it is not.

3. $52, 61, 55, 1, 59, 68, 69, 55$

   $1, 52, 55, 55, 59, 61, 68, 69$ Outlier: 1

   With Outlier:

   Mean: $\frac{1+52+55+55+59+61+68+69}{8} = \frac{420}{8} = 52.5$

   Median: 57

   Mode: 55

   Range: $69 - 1 = 68$

   σ: $\sqrt{\frac{(1-52.5)^2+(52-52.5)^2+\cdots+(69-52.5)^2}{8}} = 20.29$

   Without Outlier:

   Mean: $\frac{52+55+55+59+61+68+69}{7} = \frac{419}{7} = 59.86$

   Median: 59

   Mode: 55

   Range: $69 - 52 = 17$

   σ: $\sqrt{\frac{(52-59.86)^2+(55-59.86)^2+\cdots+(69-59.86)^2}{7}} = 6.10$

(10 points) Find the mean, median, mode, range, and standard deviation of the given data set and the set obtained by adding the given constant to each data value.

4. $25, 13, 19, 20, 19, 16, 15$; constant: 5

   $13, 15, 16, 19, 19, 20, 25$

   Without Constant:

   Mean: $\frac{13+15+16+19+19+20+25}{7} = \frac{127}{7} = 18.14$

   Median: 19

   Mode: 19

   Range: $25 - 13 = 12$

   σ: $\sqrt{\frac{(13-18.14)^2+(15-18.14)^2+\cdots+(25-18.14)^2}{7}} = 3.64$

   With Constant:

   Mean: 23.14

   Median: 24

   Mode: 24

   Range: 12

   σ: 3.64

(10 points) Complete.

5. The data set below gives the test scores of several students. Each student receives a 5% bonus for answering a bonus question correctly. Find the mean, median, mode, range, and standard deviation of their grades with and without the bonus.

$92, 97, 95, 93, 84, 85, 92, 87, 100, 94$

$84, 85, 87, 92, 92, 93, 94, 95, 97, 100$

Without Bonus:

Mean: $\frac{84+85+87+92+92+93+94+95+97+100}{10} = \frac{919}{10} = 91.9$

Median: 92.5

Mode: 92

Range: $100 - 84 = 16$

σ: $\sqrt{\frac{(84-91.9)^2+(85-91.9)^2+\cdots+(100-91.9)^2}{10}} = 4.91$

With Bonus:

Mean: $91.9 \cdot 1.05 = 96.50$

Median: $92.5 \cdot 1.05 = 97.13$

Mode: $92 \cdot 1.05 = 96.6$

Range: $16 \cdot 1.05 = 16.8$

σ: $4.91 \cdot 1.05 = 5.16$

(3 points) A normal distribution has mean $\bar{x}$ and standard deviation σ. Find the indicated probability for a randomly selected x-value from the distribution.

6. $P(\bar{x} - 2\sigma \leq x \leq \bar{x} + 3\sigma)$

$13.5\% + 34\% + 34\% + 13.5\% + 2.35\% = 97.35\%$

(4 points each) A normal distribution has a mean of 27 and a standard deviation of 5. Find the probability that a randomly selected x-value from the distribution is in the given interval.

7. Between 22 and 32

22 is one standard deviation below the mean and 32 is one standard deviation above the mean, so we find $P(\bar{x} - \sigma \leq x \leq \bar{x} + \sigma)$.

$34\% + 34\% = 68\%$

8. At most 22

22 is one standard deviation below the mean, so we find $P(x \leq \bar{x} - \sigma)$.

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

9. Between 30 and 40

$z = \frac{30-27}{5} = 0.6$ Look this up: $.7257$

$z = \frac{40-27}{5} = 2.6$ Look this up: $.9953$ $.9953 - .7257 = .2696$

10. At least 20

$z = \frac{20-27}{5} = -1.4$ Look this up: $.0808$ $1 - .0808 = .9192$

11. At most 35

$z = \frac{35-27}{5} = 1.6$ Look this up: $.9452$ $.9452$

(4 points) Complete.

12. The annual per person consumption of apples in the United States is normally distributed with a mean of 16 pounds and a standard deviation of 4 pounds. What is the probability that a randomly selected person in the United States has an annual per person consumption of apples less than 22 pounds?

$z = \frac{22-16}{4} = 1.5$ Look this up: $.9332$

$.9332$

(5 points) Identify the type of sample described. Then tell if the sample is biased. If it is biased, explain why it is biased.

13. A survey of students' favorite school subjects is being conducted. Every other student in the math club is asked "Which school subject is your favorite?"

Convenience

Biased

Math club students are not representative of the entire student body.

(3 points each) Find the margin of error for a survey with the given sample size. Round your answer to the nearest tenth of a percent.

14. 2600

$$\pm\frac{1}{\sqrt{n}} = \pm\frac{1}{\sqrt{2600}} = \pm\frac{1}{50.99} = \pm.0196 = \pm 1.96\%$$

15. 495

$$\pm\frac{1}{\sqrt{n}} = \pm\frac{1}{\sqrt{495}} = \pm\frac{1}{22.25} = \pm.0449 = \pm 4.49\%$$

(4 points each) Find the sample size required to achieve the give margin of error. Round your answer to the nearest whole number.

16. $\pm 4\%$

$$\pm\frac{1}{\sqrt{n}} = \pm.04$$
$$\left(\pm\frac{1}{\sqrt{n}}\right)^2 = (\pm.04)^2$$
$$\frac{1}{n} = .0016$$
$$n = \frac{1}{.0016}$$
$$n = 625$$

625 people

17. $\pm 3.6\%$

$$\pm\frac{1}{\sqrt{n}} = \pm.036$$
$$\left(\pm\frac{1}{\sqrt{n}}\right)^2 = (\pm.036)^2$$
$$\frac{1}{n} = .001296$$
$$n = \frac{1}{.001296}$$
$$n = 771.6$$

772 people

(4 points) Complete.

18. In a survey of 504 people in the United States, 11% said that the influx of new technologies such as computers has left them feeling overwhelmed. Find the margin of error for the survey and give an interval that is likely to contain the exact percent of all people who feel overwhelmed by the influx of new technologies.

$$\pm\frac{1}{\sqrt{n}} = \pm\frac{1}{\sqrt{504}} = \pm\frac{1}{22.45} = \pm.0445 = \pm 4.45\%$$

$$11\% + 4.45\% = 15.45\%$$
$$11\% - 4.45\% = 6.55\%$$

Between 6.55% and 15.45%