Math 101: Statistics

1. (6.1) company recorded the number of employee absences each week over a period of 12 weeks. The data list 3, 2, 1, 8, 2, 0, 7, 4, 5, 7, 6, 2. Find the mean and standard deviation of the number of absences per week. Round the standard deviation to two decimal places.

2. Find the mean and standard deviation of the following list of test scores: 82, 63, 45, 75, 88, 65, 90. Round the standard deviation to two decimal places.

3. There is 1000 lightbulbs in a building. Over a 10-month period, we record the number of bulbs that burn out each month. The result is the data list 23, 15, 21, 45, 18, 39, 50, 20, 11, 62.

    a. What is the average number of bulbs that burn out each month?

    b. What is the standard deviation of these data? Round the standard deviation to one decimal place.

    c. Use Chebyshev's inequality and your answer to parts a and b to estimate how many replacement bulbs you should keep on hand so that for at least 75% of the months you don't have to acquire additional replacement bulbs

4. (6.2) The heights of adult men in America are normally distributed, with a mean of 68.1 inches and standard deviation of 2.35 inches. Round your answers as percentages to the nearest whole number.

    a. What percentage of adult males in America is over 5' 9" tall?

    b. What percentage of adult males in America is under 5 feet 2 inches tall?

5. (6.3) Explain the meaning of a poll that says 35% of Americans approve of the president's policies, with a margin of error of 6% and confidence level of 95%

6. A poll on a certain policy reports 72% approval with a margin of error of 4.35%. What is the confidence interval for this poll?

7. (6.4) A study to test the efficacy of a drug for the treatment of allergic rhinitis (inflammation of the nasal mucous membranes) reported a p-value as 0.025. Interpret carefully what this means.

Solutions

1. The mean is $\frac{3+2+1+8+2+0+7+4+5+7+6+2}{12} = 2.64$

   The standard diveation is 2.64

   $$\sqrt{\frac{(3-3.92)^2+(2-3.92)^2+(1-3.92)^2+(8-3.92)^2+(2-3.92)^2+(0-3.92)^2+(7-3.92)^2+(4-3.92)^2+(5-3.92)^2+(7-3.92)^2+(6-3.92)^2+(2-3.92)^2}{12}} =$$
   2.64

2. The mean is $\frac{82+63+45+75+88+65+90}{7} = 72.57$

   The standard diveation is 16.05

   $$\sqrt{\frac{(82-72.57)^2+(63-72.57)^2+(45-72.57)^2+(75-72.57)^2+(88-72.57)^2+(65-72.57)^2+(90-72.57)^2}{7}} = 16.05$$

3.
   a. The mean is $\frac{23+15+21+45+18+39+50+20+11+62}{10} = 30.40$

   b. The standard diveation is 17.28

   $$\sqrt{\frac{(23-30.4)^2 + (15-30.4)^2 + (21-30.4)^2 + (45-30.4)^2 + (18-30.4)^2 + (39-30.4)^2 + (50-30.4)^2 + (20}{7}}$$
   $= 17.28$

   c. $30.40+(2)(17.28) = 64.96$

4.
   a. $z = \frac{x-\mu}{\sigma} = \frac{69-68.1}{2.35} = 0.382$
      P(Z > 0.4)=65%

   b. $z = \frac{x-\mu}{\sigma} = \frac{62-68.1}{2.35} = -2.60$
      P(Z < -2.60)=0.47%

5. Given 35% of Americans that approve of the president's policies we are 95% confident that between 29% and 41% of Americans approve of the president's policies.

6. The confidence interval = mean +/- the margin of error = 72% (+/-) 4.35% = 67.65% to 76.35%

7. small P values indicate statistical significance so a 0.025 my indicate that there is a strong statistical significance to the drug and treatment of allergic rhinitis