

Mth 23, Homework 3 on Sections 3.1, 3.2

Due by Mon, Sept 28.

Write all your working out and answers on your own notepaper. Please use lots of space and as many pages as you want, so I can include corrections or comments. You do not need to write the questions, but it is very important that you explain your answers and show clearly any work you had to do. Each question is worth 3 points.

Section 3.1 Measures of Central Tendency: Mode, Median, and Mean

- (1) For this data set

10 12 20 15 20

find the following, showing your work:

- (a) the mode,
- (b) the median,
- (c) the mean.

- (2) For this data set

8 2 3 7 6 4

find the following, showing your work:

- (a) the mode,
- (b) the median,
- (c) the mean.

- (3) Briefly explain what each of these symbols mean for us in your own words:

(a) $\sum x$ (b) n (c) N (d) $\bar{x}$ (e) μ

- (4) A random sample of ground temperatures in degrees F was taken between May and November at Furness Creek in Death Valley, CA, giving the data

146 152 168 174 180 178 179

- (a) Compute the mean.
- (b) Write a precise sentence in your own words describing your result from part (a) and what it means.

Section 3.2 Measures of Variation

Defining formula for sample standard deviation $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$

Computational formula for sample standard deviation $s = \sqrt{\frac{\sum x^2 - (\sum x)^2/n}{n - 1}}$

Defining formula for population standard deviation $\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N}}$

Computational formula for population standard deviation $\sigma = \sqrt{\frac{\sum x^2 - (\sum x)^2/N}{N}}$

The sample variance is s^2 and the population variance is σ^2 (in other words the same formulas without the square roots).

- (5) (a) Compute the range of the data set: 5 10 7 12 3 7 6

(b) If a data set has range 0 what does that tell you?

- (6) For this sample data set, calculate its variance and standard deviation on a calculator using the defining formula with the following steps

13 22 20 15 20

(a) Find the sample mean $\bar{x}$.

(b) Find $\sum (x - \bar{x})^2$, which is the sum of the squares of differences from the mean.

(c) Divide part (b) by $n - 1$ to get the sample variance.

(d) Take the square root of part (c) to get the sample standard deviation, rounded to two places.

- (7) Find s for the last question using the computational formula instead, with these steps:

(a) Compute $\sum x^2$, which is the sum of the squares of the data values.

(b) Compute $(\sum x)^2$, which is the square of the sum of the data values.

(c) Find $\sum x^2 - (\sum x)^2/n$.

(d) Lastly divide part (c) by $n - 1$ and then take a square root. You should get the same answer for s as you got in Question 6 part (d).

- (8) For this population data set, calculate its variance and standard deviation using either the defining formula or the computational formula. You must show your working out to get credit.

4 2 7 1 2 8

- (9) A factory is producing 3.5 inch nails. A random sample of $n = 120$ nails is taken for quality control. The sample has mean $\bar{x} = 3.5$ inches and standard deviation $s = 0.07$ inches.

- (a) Use Chebyshev's theorem to find a length interval that contains at least 75% of the sample nails. Write your answer in words as a precise sentence.
 - (b) Use Chebyshev's theorem to find a length interval that contains at least 93.8% of the sample nails. Write your answer in words as a precise sentence.
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Many of you are using AI to help with homework questions. You can paste them in and get step by step answers most of the time. If you are using AI, the smart way is:

- Study the relevant class notes and section in the textbook first.
- Try the homework questions yourself.
- Use AI help if you're having trouble.
- Make sure you understand the answers you're handing in - there will be similar questions on exams.

If you're still stuck on a question:

- Ask me about it after class.
 - Come to my office hours: Mon 12:00 - 1:00, Wed 12:00 - 1:00 in CP 317.
 - Go to the Math Tutorial Lab in-person in CP 303 or online.
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Note – If I don't have time to grade every question then I will just grade two random ones. Then your score will be awarded as follows

- First graded question: 25%
- Second graded question: 25%
- You provided answers to all questions: 25%
- Homework was done neatly and submitted on time: 25%