EXERCISES (bonus)

1. The prices of 12 randomly chosen homes in dollars (approximated to nearest thousand) in a growing region of Tampa in the summer of 2002 are given below.

176	105	133	140	305	215	207	210	173	150	78	96

Find the mean and standard deviation of the sampled home prices from this area.

2. The following is a sample of nine mortgage companies' interest rates for 30-year home mortgages, assuming 5% down.

7.625	7.500	6.625	7.625	6.625	6.875	7.375	5.375	7.500

(a) Find the mean and standard deviation and interpret.
(b) Find lower and upper quartiles, median, and interquartile range. Check for any outliers and interpret.

3. For four observations, it is given that mean is 6, median is 4, and mode is 3. Find the standard deviation of this sample.

4. The data given below pertain to a random sample of disbursements of state highway funds (in millions of dollars), to different states.

1188	1050	2882	2802	780	1171	685
537	519	2523	316	1117	1578	261

(a) Find the mean, variance, and range for these data and interpret.
(b) Find lower and upper quartiles, median and interquartile range. Check for any outliers and interpret.
(c) Construct a box plot and interpret.

5. Maximal static inspiratory pressure (PImax) is an index of respiratory muscle strength. The following data show the measure of PImax (cm H2O) for 15 cystic fibrosis patients.

105	80	115	95	100	85	90	70
135	105	45	115	40	115	95	

(a) Find the lower and upper quartiles, median, and interquartile range. Check for any outliers and interpret.
(b) Construct a box plot and interpret.
(c) Are there any outliers?

5. The following are the closing prices of some securities that a mutual fund holds on a certain day:

10.25	5.31	11.25	13.13	18.00	32.56	37.06	39.00
43.25	45.00	40.06	28.56	22.75	51.50	47.00	53.50
32.00	25.44	22.50	30.00	24.75	53.37	51.38	26.00
53.50	29.87	32.00	28.87	42.19	37.50	30.44	41.37

(a) Find the mean, variance, and range for these data and interpret.
(b) Find lower and upper quartiles, median, and interquartile range. Check for any outliers.
(c) Construct a box plot and interpret.
(d) Construct a histogram.
(e) Locate on your histogram x, x ± s, x ± 2s, and x ± 3s. Count the data points in each of the intervals x ± s, x ± 2s, and x ± 3s and compare this with the empirical rule.

6. The radon concentration (in pCi/liter) data obtained from 40 houses in a certain area are given below.

2.9	0.6	13.5	17.1	2.8	3.8	16.0	2.1	6.4	17.2
7.9	0.5	13.7	11.5	2.9	3.6	6.1	8.8	2.2	9.4
15.9	8.8	9.8	11.5	12.3	3.7	8.9	13.0	7.9	11.7
6.2	6.9	12.8	13.7	2.7	3.5	8.3	15.9	5.1	6.0

(a) Find the mean, variance, and range for these data.
(b) Find lower and upper quartiles, median, and interquartile range. Check for any outliers.
(c) Construct a box plot.
(d) Construct a histogram and interpret.
(e) Locate on your histogram $x \pm s$, $x \pm 2s$, and $x \pm 3s$. Count the data points in each of the intervals x, $x \pm s$, $x \pm 2s$, and $x \pm 3s$. How do these counts compare with the empirical rule?

7. For the following data:

6.3	2.9	4.5	1.1	1.8	4.0	1.2	3.1	2.0	4.0
7.0	2.8	4.3	5.3	2.9	8.3	4.4	2.8	3.1	5.6
4.5	4.5	5.7	0.5	6.2	3.7	0.9	2.4	3.0	3.5

(a) Find the mean, variance, and standard deviation.
(b) Construct a frequency table with five classes.
(c) Using the grouped data formula, find the mean, variance, and standard deviation for the frequency table constructed in part (b) and compare it to the results in part (a).

8. In order to assess the protective immunizing activity of various whooping cough vaccines, suppose that 30 batches of different vaccines are tested on groups of children. Suppose that the following data give immunity percentage in home exposure values (IPHE values).

85	51	41	90	91	40	39	69	45	47
42	12	70	38	97	34	94	77	88	91
79	90	43	40	89	85	71	30	25	21

(a) Find the mean, variance, and standard deviation and interpret.
(b) Construct a frequency table with five classes.
(c) Using the grouped data formula, find the mean, variance, and standard deviation for the table in part (b) and compare it to the results in part (a).

9. Table 1 gives the distribution of the masses (in grams) of 50 salmon from a single young cohort

Weight	155–164	165–174	175–184	185–194	195–204
Frequency	8	11	18	9	4

(a) Using the grouped data formula, find the mean, variance, and standard deviation
(b) Find the median for this grouped data.

10. After a pollution accident, 180 dead fish were recovered from a stream. Table gives their lengths measured to the nearest millimeter.

Length of Fish (mm)	1–19	20–39	40–59	60–79	80–99
Frequency		38	31	59	45	7

(a) Using the grouped data formula, find the mean, variance, and standard deviation.
(b) Find the median for this grouped data and interpret.

Chebyshev's inequality

If the set of numbers has the mean that is equal to μ and standard deviation is σ, then in interval $(\mu - k\sigma; \mu + k\sigma), (k > 1)$ lay not less than $\left(1 - \dfrac{1}{k^2}\right) \cdot 100\%$ elements of this set.

EXERCISES

1. If the set of numbers has the mean that is equal to 15 and standard deviation is 3, then what minimal part of elements of this set is in interval (9; 21)?

2. If the set of numbers has the mean that is equal to μ and standard deviation is σ, then what is the minimal part of elements of this set in interval:

a) $(\mu - \sigma; \mu + \sigma)$;

b) $(\mu - 2\sigma; \mu + 2\sigma)$;

c) $(\mu - 3\sigma; \mu + 3\sigma)$?

3. If the set of numbers has the mean that is equal to 10 and standard deviation 3, then what is the minimal part of elements in the interval (5,5; 14,5)?

4. If the set of numbers has the mean that is equal to 105 and dispersion 144, then what is the minimal part of elements of this set in interval (45; 165)?

5. If the set of numbers that describes monthly revenue of shop has the mean that is equal to 150 and dispersion 16, then can we expect that revenue of next month will be between 140 and 160?

6. If for numbers that describe annual volume of production of firm, the mean is equal to 500 and standard deviation is 30, and then is it possible to believe in heads' of this firm promises of producing more than 620 units of product next year?