MATH 10043 ELEMENTARY STATISTICS SPRING 2013
ANSWERS TO SELECTED EVEN PROBLEMS & PRACTICE PROBLEMS, UNIT 1

Section **Problems/Answers**

1.3 **(2)** Qualitative data are values assigning items to non-numeric categories; quantitative data are numerical values representing counts or measurements for the items. **(4)** The 45% value is a statistic since it was determined from the 877 executives in the sample. The population consists of all executives. The practical implication: proofread job applications. **(14)** discrete **(16)** continuous **(30)** The sample is the 1012 adults; population is all adults ; Yes –sample was random.

1.4 **(14)** designed to influence in favor of Sweeney's opponent **(16)** people will be reluctant to give a financial advisor a poor rating

1.6 **(4)** main use, secondary use, and alphabetic use

Ch. 1 **Practice problems**: **1.** (a) population (b) sample (c) statistic (d) parameter **2.** (a) D (b) Q (c) C (d) D (e) C (f) Q

2.2 **(4)** The gap suggests that people from two populations were used – perhaps children & teachers. **(18)** Helpful to detect dangerous situations & make recommendations for the future.

Level of strontium-90	Frequency
110 – 119	2
120 – 129	2
130 - 139	5
140 – 149	9
150 – 159	13
160 – 169	6
170 – 179	2
180 – 189	1
	Σ 40

Practice problems on example sheet: **1.(a)** 0.050, 0.250, 0.300, 0.225, 0.175 **(b)** 40
2.

Height (in inches)	Frequency	Relative frequency
0 – 4	**2**	**0.125**
5 – 9	**3**	**0.188**
10 - 14	**4**	**0.250**
15 – 19	**6**	**0.375**
20 – 24	**0**	**0**
25 – 29	**1**	**0.063**

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Section **Problems/Answers**

2.2 **Practice problems on example sheet: (continued)**

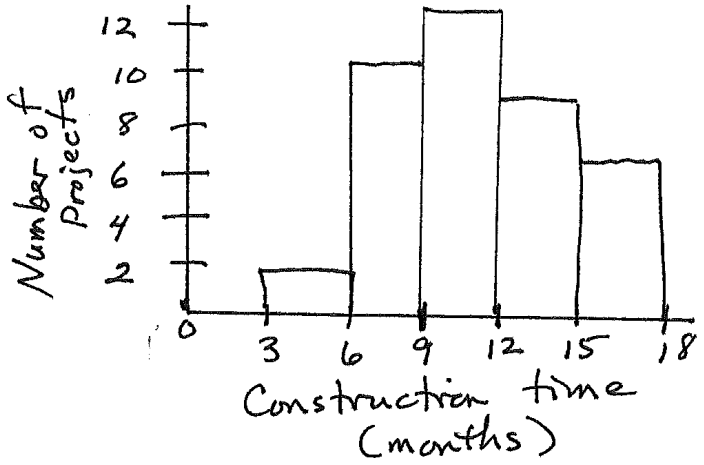
3.

Elementary Grade	Number of children in program	Relative frequency
1	3	0.125
2	4	0.167
3	6	0.250
4	7	0.292
5	4	0.167

2.3 **IMPORTANT NOTE**: on histograms, use the classes given in the frequency distribution for labeling the x-axis –- do not use the ±0.5 values in the back of your textbook.

Practice problems on example sheet:

#1.



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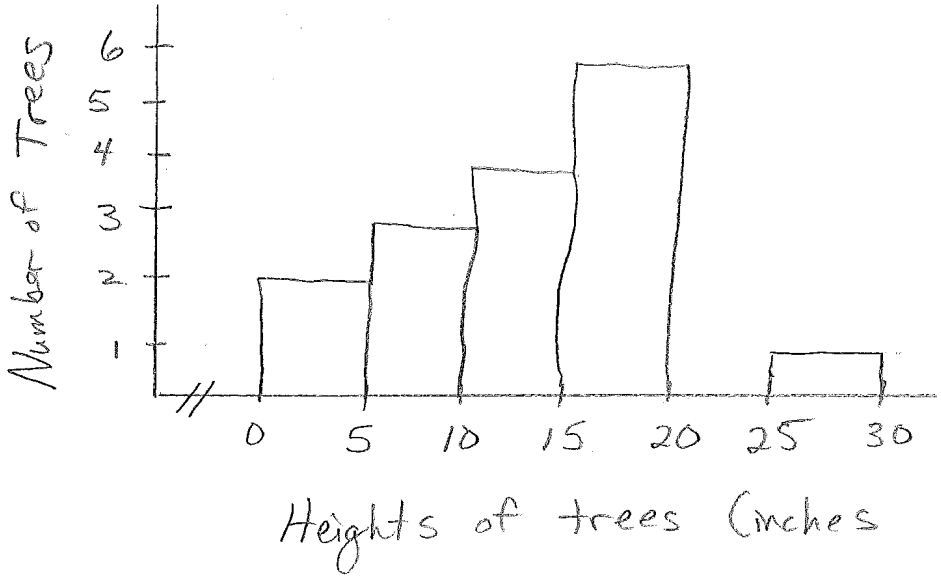
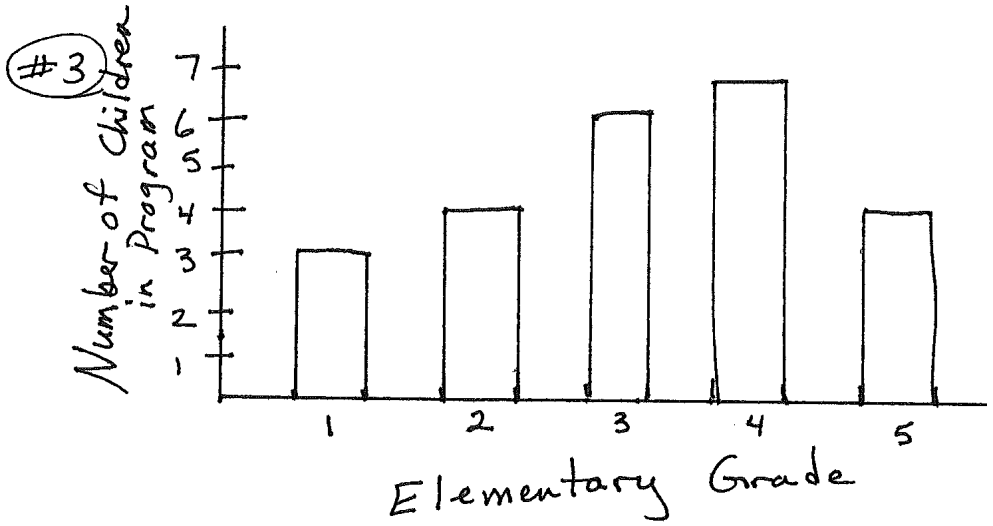
Section **Problems/Answers**

2.3 **Practice problems on example sheet: (continued)**

#2.





Section **Problems/Answers**

2.4 **Practice problems on example sheet**:

1. Comparative:

CREAMY	STEM	CRUNCHY
2	2	
0 0 9 6	3	4 4 6
4 0 1 5 4	4	2 7 0 2 7
6 6 0 0 0 3 6	5	3 2 0 6
8 5 2	6	2 2 2 8
	7	5 5 1
	8	0

2. Regular:

STEM	LEAVES
1	8
2	0 7 5 6 9 2 5 8 7 6 4 5 3
3	6 3 1 4
4	7 9
5	4

Repeated:

STEM	LEAVES
1L	
1H	8
2L	0 2 4 3
2H	7 5 6 9 5 8 7 6 5
3L	3 1 4
3H	6
4L	
4H	7 9
5L	4
5H	

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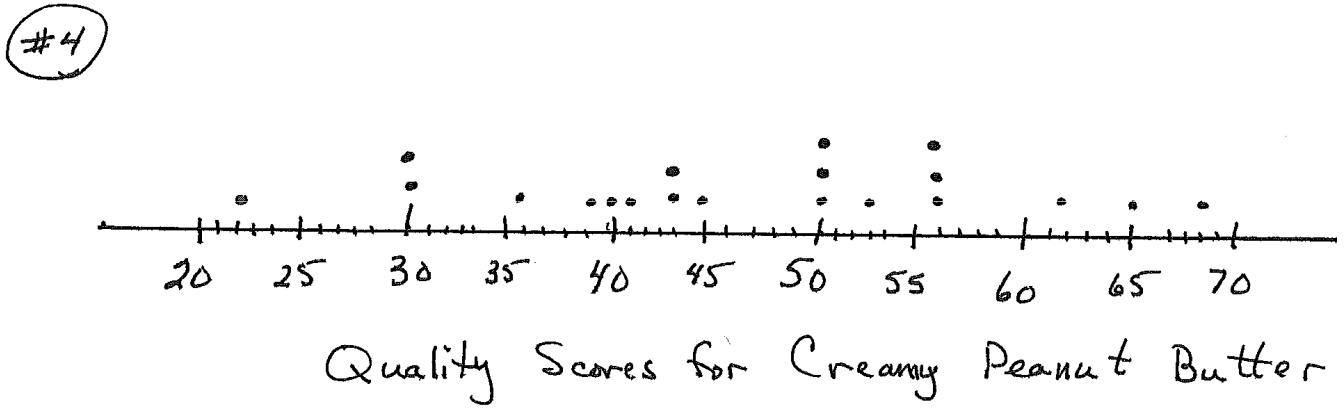
Section **Problems/Answers**

2.4 **Practice problems on example sheet: (continued)**

3. 1.4. 1.7. 1.1. 2.4. 2.5. 3.5. 3.0. 3.4. 3.1. 4.4. 5.5. 5.7. 5.8. 6.8. 6.8. 6.2. 6.8. 6.6. 7.5. 9.4



3.2 **(10)** MEAN = 1.9 ; MEDIAN = 2 ; MODE = 2; MIDRANGE = 2.5 They can be calculated, but do not have any meaning because the designations of numbers for each phenotype are arbitrary. **(14)** $\bar{X}$ = $457,874.10 ; MEDIAN = $325,073.50 ; MODE: none ; MIDRANGE = $690,710.50 **(36)** Ignoring the signs, the mean is 15.6 years. Since the four that are still living can only increase in value, the mean is *at least* 15.6 years.

3.3 **(10)** They can be calculated, but are meaningless because the designations of numbers for each phenotype are arbitrary. **(14)** s = $371,574.50 If the highest salary is omitted, s = $217,031.60 – a substantial change. (21) 30 days: s = $23.30; 1 day: s = $233.00 There is higher variation in tickets sold 1 day in advance. **(30)** $\bar{X}$ = 76.8 beats/min; s = 12.3 beats/min **Practice Problem on Example sheet**: **1**. (a) $\bar{X}$ = $5.50. This is higher than the range for the national average. (b) median = $5, mode = $5, midrange = $6 (c) s = $1.96 **2.** Every data value is the same. **3.** Units for standard deviation would be in ounces. Units for variance would be in ounces squared **4**. $\bar{X}$ = 11.2 months, s = 3.5 months **5.** (a) 50% (b) 68% (c) 16% (d) 2.5% (e) 81.5% **6.** (a) 99.7% (b) 97.5% (c) 84%

Section **Problems/Answers**

3.4 **(2)** The z score is in 'standard deviations from the mean.'
Practice Problems on Example sheet: **1**. Liz, with a z-score of 1.40 scored higher than Kate, whose z-score was 1.25

2. (a) $Q_1 = 14$, $Q_2 = 24$, $Q_3 = 32$; 9, 14, 24, 32, 38 ; iqr = 18 (b) $Q_1 = 21$, $Q_2 = 31.5$, $Q_3 = 38$; 5, 21, 31.5, 38, 46 ; iqr = 17 . **3.** (a) -1.76 (b) 0.42 (c) 1.63 **4.** 680 **5.** (a) The data value is one-and-a-half standard deviations above (greater than) the mean of that data set. (b) The data value is 2.1 standard deviations below (less than) the mean of that data set. (c) Standard score (z-score) measures the distance or location of the data value in terms of standard deviations away from the mean. **6.** $z_A = 1.63$; $z_B = 1.20$; A has the higher relative position – i.e., it is more standard deviations above its mean. **7.** $z_C = -.89$; $z_D = -.21$; C has the lower relative position – i.e., it is more standard deviations below its mean because its z-value is more negative. **8.** Because the Empirical Rule tells us that for a normal distribution, 99.7% of the data will lie within 3 standard deviations of the mean, i.e. between z = -3 and z = +3.
9. (a) 120 (b) 144 (c) 92 (d) 161 **10.** $\bar{X}$ = 159 feet **11.** s = 12 sit-ups

10.2 **2.** Correlation measures only association and not cause-and-effect. If there is an association between two variables, it may or may not be cause-and-effect, and it if is cause-and-effect, there is nothing in the mathematics of correlation analysis to identify which variable is the cause and which is the effect. **6.** r = 0.69 There is a moderately strong, positive correlation between the height of a mother and the height of her daughter. **7.** r = 0.20 There is a weak, positive correlation between the height and pulse rate of women. **13.** r = 0.99 There is an extremely strong, positive correlation between Consumer Price Index and cost of a slice of pizza. **16.** r = -0.22 There is a weak, negative correlation between the height of the winning candidate for the U.S. presidency and the height of the runner up. **19.** r = 0.71 There is a fairly strong, positive correlation between the cost of airline tickets purchased 30 days in advance versus tickets purchased one day in advance.
21. r = -0.28 There is a weak, negative correlation between the cost of a full-front crash and the cost of a full-rear crash.
Practice Problems on Example Sheet: 1. There is a weak, positive correlation between the outdoor temperature and the number of customers using the health spa facilities in the summer.
2. There is a fairly strong, positive correlation between the age and price of bottles of very fine wine.

10.3 **7.** NO prediction should be made because r is weak. **8.** NO prediction should be made because r is weak.
13. $\hat{y} = 0.01x - 0.162$; \$1.66 per slice. **16.** $\hat{y} = -0.321x + 95.4$ NO prediction should be made because r is weak.
19. $\hat{y} = 7.07x - 1237.63$; \$883. **21.** $\hat{y} = -0.19x + 2062.62$ NO prediction should be made because r is weak.
Practice Problems for section 10.3: **1. (b)** r = 0.98 There is an extremely strong, positive correlation between the age and height of Mrs. Owen's son. (**c**) $\hat{y} = 0.60x + 22.63$ **(d)** x = 27 months $\hat{y}$ = 38.8 inches **NOTE**: it would be correct to mention a slight extrapolation, or to decide that it is not appropriate to predict because of extrapolation. (**e**) x = 18 years = 216 months! It is not appropriate to make the prediction because of extrapolation. (If it were, he'd be 12.7 feet tall!)
2. (a) r = 0.94 There is a very strong, positive correlation between the length of a person's stride and that person's height.
(c) $\hat{y} = 1.41x + 30.55$ **(d)** x = 3 feet = 36 inches. It is not appropriate to make the prediction because of extrapolation.
(e) x = 31 inches $\hat{y}$ = 74.3 inches