Show all work neatly and systematically for full credit. Total points: 102

(4) Determine whether the given value is a statistic or a parameter.

1) a. After inspecting all of 55,000 kg of meat stored at the Wurst Sausage Company, it was found that 45,000 kg of the meat was spoiled.

Parameter ✓

b. A sample of 120 employees of a company is selected, and the average age is found to be 37 years.

Statistic ✓

(4) Determine whether the given value is from a discrete or continuous data set.

2) a. The temperature of a cup of coffee is 67.3°F.

continuous ✓

b. The number of students in a math 227 class.

discrete ✓

(6) Determine which of the four levels of measurement (nominal, ordinal, interval, ratio) is most appropriate.

3) a. Nationalities of survey respondents.

nominal ✓

b. The Student's grades, A, B, or C, on a test.

ordinal ✓

c. Amount of fat (in grams) in cookies.

ratio ✓

(3) Determine whether the given description corresponds to an observational study or an experiment.

4) A clinic gives a drug to a group of ten patients and a placebo to another group of ten patients to find out if the drug has an effect on the patients' illness.

experiment ✓

(6) Identify which of these types of sampling is used: random, stratified, systematic, cluster, convenience.

5) a. 49, 34, and 48 students are selected from the Sophomore, Junior, and Senior classes with 496, 348, and 481 students respectively.

stratified ✓

b. A sample consists of every 50th students from a group of 1496 students.

systematic ✓

c. A pollster uses a computer to generate 500 random numbers, then interviews the voters corresponding to those numbers.

random ✓

✓ long period of time
x past
x future

(3) Identify the type of observational study (cross–sectional, retrospective, prospective).

6) A statistical analyst obtains data about ankle injuries by examining a hospital's records from the past 3 years.

retrospective ✓

Provide an appropriate response.

7) (2, 2, 2, 3, 4) The following frequency distribution analyzes the scores on a math test.

Scores	Number of students (f)	b) Midpts (x)	c) Class Bound.
40–54	2 ✓	94/2 = 47	35.5 – 54.5
55–69	4 ✓	62	54.5 – 69.5
70–84	6 ✓	77	69.5 – 84.5
85–99	15 ✓	92	84.5 – 99.5
100–114	5 ✓	107	99.5 – 114.5 ✓

a. Find the class width.

Width 15 ✓

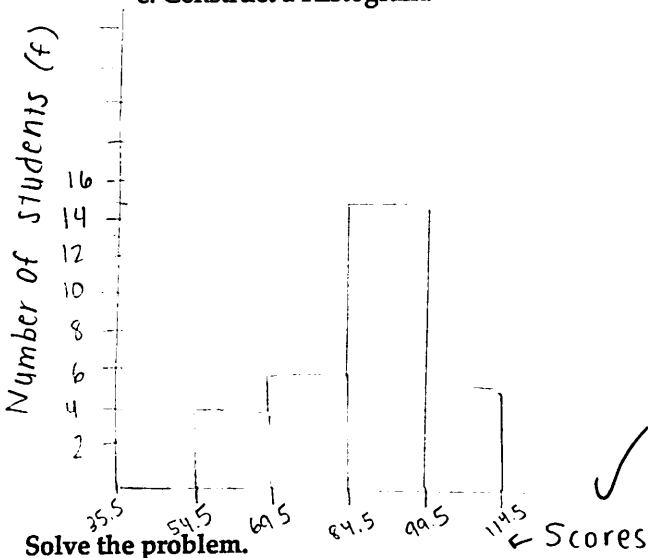b. Find the class midpoints, extend a column to fill in those numbers.

c. Find the class boundaries, extend a column to fill in those numbers.

d. Find the mean of the frequency distribution.

$$\bar{x} = \frac{\sum(f \cdot x)}{\sum f} \rightarrow \frac{2(47) + 4(62) + 6(77) + 15(92) + 5(107)}{32} = \frac{94 + 248 + 462 + 1380 + 535}{32} = \frac{2719}{32}$$

$$\boxed{\bar{x} = 84.96} \checkmark$$

e. Construct a Histogram.

Solve the problem.

8) (5) Michael gets test grades of 73, 77, 82, and 86. He gets a 93 on her final exam. Find the weighted mean if the tests each count for 15% and the final exam counts for 40% of the final grade. Round to one decimal place.

$$\bar{w} = \frac{\sum wx}{\sum w}$$

"x" Grades	"w"	w·x
73	.15	73×.15 = 10.95
77	.15	11.55
82	.15	12.3
86	.15	12.9
93	.40	37.2
	.1	

$$\bar{w} = \frac{84.9}{1} \qquad \boxed{\bar{w} = 84.9} \checkmark$$

2

Use the given data to construct a frequency distribution.

9) (6) A medical research team studied the ages of patients who had strokes caused by stress. The ages of 34 patients who suffered stress strokes were as follows.

29 30 36 41 45 50 57 61 28 50 36 58
60 38 36 47 40 32 58 46 61 40 55 32
61 56 45 46 62 36 38 40 50 27

Construct a frequency distribution for these ages. Use <u>8 classes</u> beginning with a lower class limit of 25.

$\frac{max - min}{\# \text{ of class}}$ → $\frac{62 - 27}{8} = \frac{35}{8} = 4.375$

$\frac{62 - 25}{8} = \frac{37}{8} = 4.6 \approx (5)$

Ages	# of patients
1 25 – 29	3
2 30 – 34	3
3 35 – 39	6
4 40 – 44	4
5 45 – 49	5
6 50 – 54	3
7 55 – 59	5
8 60 – 64	5

10) (5) Write symbol for the following:

a. Population standard deviation: σ ✓

b. Sample mean: $\overline{X}$ ✓

c. Sample standard deviation: S ✓

d. Populaiton mean: μ ✓

e. Sample size: $\boxed{X}$

Solve the problem.

11) (4) The ages of the members of a gym have a mean of 48 years and a standard deviation of 11 years. What can you conclude from Chebyshev's theorem about the percentage of gym members aged between 19.4 and 76.6?

$Z = \frac{X - \overline{X}}{S}$

$Z = \frac{19.4 - 48}{11}$

$= \frac{-28.6}{11}$

$Z = -2.6$

$Z = \frac{76.6 - 48}{11}$

$Z = 2.6$

$\boxed{K = 2.6}$ ✓

$1 - \frac{1}{2.6^2} = 0.85$

(68.1) of gym members are between at least 19.4 and 76.6 because the 85% values fall within 1 standard deviation of mean.

(3) Solve the problem. Round results to the nearest hundredth.

12) The mean of a set of data is 5.73 and its standard deviation is 3.44. Find the z score for a value of 13.87.

$Z = \frac{13.87 - 5.73}{3.44} = \frac{8.14}{3.44} = \boxed{2.37}$ ✓

(-2)

3

$$Z = \frac{X - \bar{X}}{S}$$

Use the empirical rule to solve the problem.

13) (4) At one college, GPA's are normally distributed with a mean of 2.9 $^{\bar{X}}$ and a standard deviation of 0.6 ^{S}. What percentage of students at the college have a GPA between 2.3 and 3.5? Show work.

$$Z = \frac{2.3 - 2.9}{0.6} \qquad Z = \frac{3.5 - 2.9}{0.6}$$

$$= \frac{-0.6}{0.6} \qquad \qquad = 1$$

$$= -1$$

▷ Based on the empirical rule, 68% of students at the college have a GPA between 2.3 and 3.5 because it falls within 1 standard deviation from the mean.

14) (5) The weights (in pounds) of seven dogs are listed below.
   17 56 85 38 138 98, 85
   Find the following:

a. Mean: 73.86

b. Median: 85

c. Mode: 85

d. Standard Deviation: 40.38

e. Variance: 1630.54 $(40.38)^2$

**Use the given data to construct a frequency distribution.**

15) (8) A school district performed a study to find the main causes leading to its students dropping out of school. Thirty cases were analyzed, and a primary cause was assigned to each case. The causes included unexcused absences (U), illness (I), family problems (F), and other causes (O). The results for the thirty cases are listed below

   U U U I F O O U U F
   F O U I I F I I O U
   I I F U U I I O U U

a. Construct a table summarizing the frequency distribution of the primary causes leading to student dropout.

b. Draw a Pareto Chart for part a.

causes	# of cases
U	11
I	8
F	6
O	5
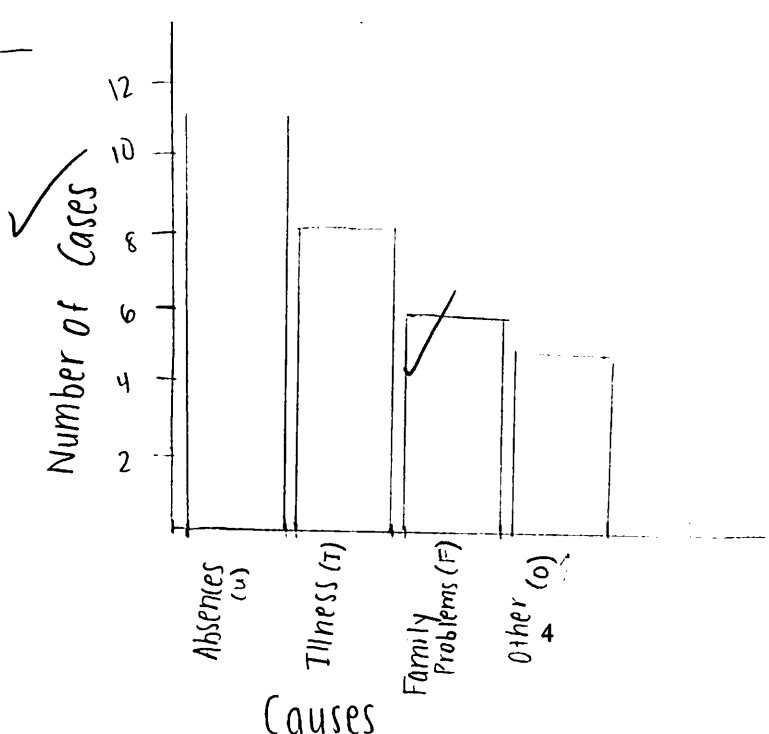
(4) Solve the problem. Round results to the nearest hundredth. $\bar{x}$ s

16) A department store, on average, has daily sales of $29,876.76. The standard deviation of sales is $1000. On Tuesday, the store sold $34,893.71 worth of goods. Find Tuesday's z score. Was Tuesday an unusually good day?

$$Z = \frac{34,893.71 - 29,876.76}{1000} = \frac{5016.95}{1000} = 5.016\ldots$$

$$Z = 5.02$$

↖ passes the +2

Yes, Tuesday was unusually good

(4) Find the percentile for the data value.

17) Data set: 4 13 8 6 4 4 13 6 4 13 2 13 15 5 9 4 12 8 6 13;

data value: 6

$$\frac{7}{20} \cdot 100 \rightarrow .35 \times 100 = 35 \quad \boxed{P_6 = 35}$$

Find the indicated measure.

18) (15: 4, 3, 3, 5) The weights (in pounds) of 30 newborn babies are listed below.

5.0 5.7 5.8 5.9 6.1 6.1 6.4 6.4 6.5 6.6
6.7 6.7 6.7 6.9 7.0 7.0 7.0 7.1 7.2 7.2
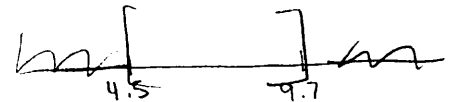7.4 7.5 7.7 7.7 7.8 8.0 8.1 8.1 8.9 10.7

a. Find P_{36}.

$$P_{36} \rightarrow L = \frac{36}{100} \cdot 30 = .36 \times 30 = 10.8 \approx 11 \quad \boxed{P_{36} = 6.7}$$

b. Find $Q_1, Q_2,$ and Q_3.

$$Q_1 \rightarrow P_{25} = L\frac{25}{100} \cdot 30 = 7.5 \quad\quad P_{50} = L\frac{50}{100} \cdot 30 = 15 \quad\quad P_{75} : L = \frac{75}{100} \cdot 30$$

$$\boxed{Q_1 = 6.4} \quad \approx 8 \quad\quad \boxed{Q_2 = 7.0} \quad\quad = 22.5 \approx 23$$
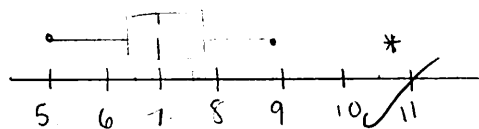
$$\boxed{Q_3 = 7.7}$$

c. Find IQR, and determine whether there is any outliers. (Find the upper fence and lower fence first).

$$IQR = Q_3 - Q_1 \rightarrow IQR = 7.7 - 6.4$$

$$\boxed{1.3}$$

Upper fence	Lower fence	Outliers:
7.7 + 1.5(1.3)	6.4 - 1.5(1.3)	10.7
7.7 + 1.95	6.4 - 1.95	
$\boxed{9.7}$	$\boxed{4.5}$	

d. List the 5-number summary, then draw a modified boxplot. Does it appear that the data is normally distributed?

1. min: 5.0
2. $Q_1 = 6.4$
3. $Q_2 = 7.0$
4. $Q_3 = 7.7$
5. max: 8.9

▷ Skewed to the right because right tail is longer because of outlier