

Practice Exam #1: Chapters 1 - 3

NAME ANSWERS KEY

Math 160
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100 points. Show all work to receive full credit. You may use a calculator. CHECK YOUR WORK!!!!

1. (35 pts total) Use the employment information shown in the table for Alpha Corporation to answer the following questions.

A. (4 pts) Find the lower and upper class boundaries for the second class.

5.5, 10.5 yrs

Years Employed at Alpha Corporation		
Years of Service	# of Employees	MIDPTS
1 - 5	5	3
6 - 10	20	8
11 - 15	25	13
16 - 20	10	18
21 - 25	5	23
26 - 30	3	28
	<u>68</u>	

B. (4 pts) Find $\sum f$ 68

C. (2 pts) What is the class width? 5 yrs

D. (4 pts) What is the cumulative frequency of the fourth class? 60

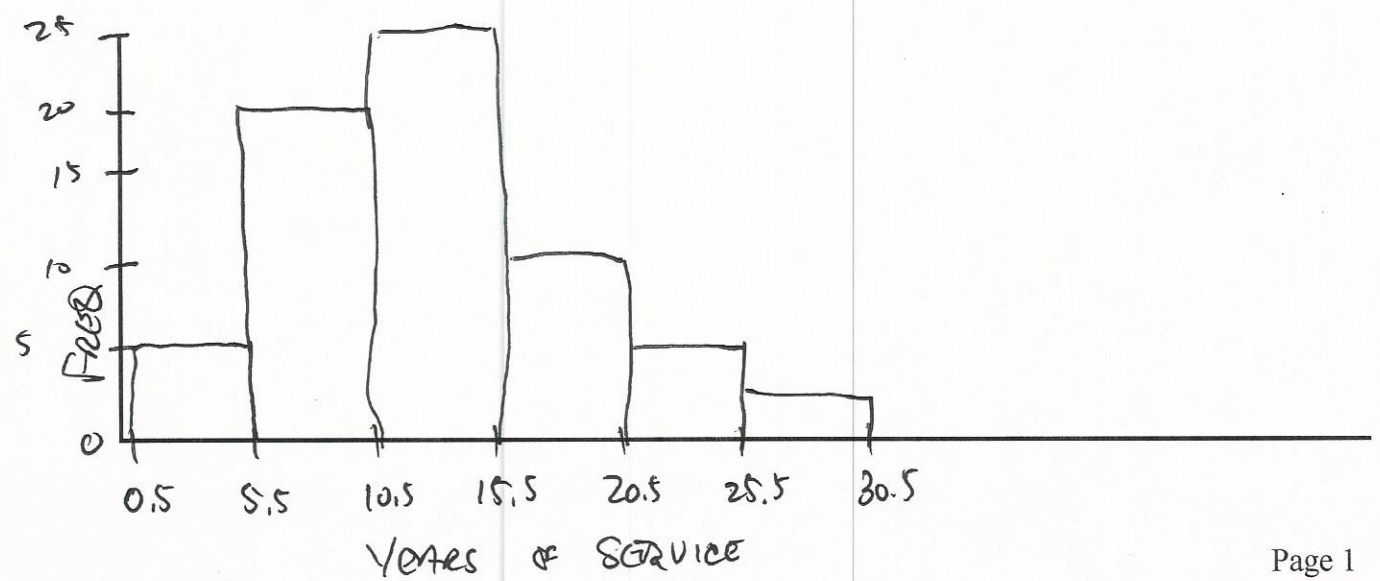
E. (4 pts) What is the relative frequency of the third class? ~~25/68~~ = $\frac{25}{68} = 0.368$

F. (5 pts) Find the mean of the frequency distribution. 12.9 yrs

$$\bar{x} = \frac{\sum fx}{\sum f} = \frac{3(5) + 8(20) + 13(25) + 10(10) + 5(23) + 3(28)}{68}$$

$$= 12.92647 = \underline{12.9 \text{ yrs}}$$

G. (12 pts) Construct a histogram using the frequency for the vertical axis and the class boundaries for the horizontal axis. Label each appropriately.



Round in accordance with the data provided following the rounding rules we talked about in class.

2. (24 pts total) Fourteen different second-year medical students measured the blood pressure of the same person. The sample data below are the systolic readings in mm Hg:

140, 140, 150, 132, 140, 143, 136, 137, 136, 143, 130, 150, 143, 131
 130, 131, 132, 136, 136, 137, 140, 140, 140, 143, 143, 143, 150, 150

A. Find the standard deviation of the data set. 6.2 mm Hg

B. Find the median of the data set. 140.0 mm Hg

C. Find the mean of the data set. 139.4 mm Hg

D. Find the variance, 39.0 (mm Hg)²
 $S^2 = (6.24632)^2 = 39.0165$

E. Find the mode. 140, 143 mm Hg

F. Using the range rule of thumb, find the standard deviation.

$$S \approx \frac{\text{RANGE}}{4} = \frac{150 - 130}{4} = \frac{20}{4} = \underline{5.0}$$

$$S = \sqrt{\frac{n(\sum x^2) - (\sum x)^2}{n(n-1)}} = \sqrt{\frac{14(272393) - (1957)^2}{14(13)}} = 6.24632$$

$$\bar{x} = \frac{x_7 + x_8}{2} = \frac{140 + 140}{2} = 140$$

$$\bar{x} = \frac{\sum x}{n} = \frac{1951}{14} = 139.357$$

$$\boxed{5.0 \text{ mm Hg}}$$

3. (9 pts total) The mean electrical energy consumption amounts for a home during a two-month period is 2767 kWh with a standard deviation of 472 kWh.

A. Find the minimum "usual" value.

$$\text{MIN} = \mu - 2\sigma = 2767 - 2(472) = \boxed{1823 \text{ kWh}}$$

B. Find the maximum "usual" value.

$$\text{MAX} = \mu + 2\sigma = 2767 + 2(472) = \boxed{3711 \text{ kWh}}$$

C. For on particular two-month period, the power company recorded consumption of 1800 kWh. Is that amount unusual?

SINCE 1800 kWh IS LESS THAN MIN USUAL OF 1823 kWh, IT IS UNUSUAL.

4. (6 pts) At one college, GPA's are normally distributed with a mean of 2.8 and a standard deviation of 0.4. What percentage of students at the college have a GPA between 2.4 and 3.2? Use the empirical rule.

$$X = 2.4$$

$$Z = \frac{X - \mu}{\sigma} = \frac{2.4 - 2.8}{0.4} = \underline{\underline{-1.00}}$$

$$X = 3.2 \quad Z = \frac{3.2 - 2.8}{0.4} = \underline{\underline{1.00}}$$

$\approx 68\%$ BETWEEN
 ± 1 STD. DEV.

5. (6 pts) The ages of members of a gym have a mean age of 47 years and a standard deviation of 12 years. What can you conclude from Chebyshev's theorem about the percentage of gym members aged between 19.4 and 74.6?

$$X = 19.4$$

$$K = \frac{X - \mu}{\sigma} = \frac{19.4 - 47}{12} = \underline{\underline{-2.3}}$$

$$X = 74.6 \quad K = \frac{74.6 - 47}{12} = \underline{\underline{2.3}}$$

$$\left(1 - \frac{1}{K^2}\right) \times 100\%$$

$$\left(1 - \frac{1}{2.3^2}\right) \times 100 = \underline{\underline{81.0964}}$$

AT LEAST 81.1%
OF MEMBERS
AGED BETWEEN
19.4 & 74.6

6. (6 pts) The weight (in pounds) of 30 newborn babies are listed below. Find Q_1 .

5.5 5.7 5.8 6.0 6.1 6.1 6.3 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 8.3 8.7

$$Q_1: L = \frac{K}{100} \cdot n = \frac{25}{100} (30) = 7.5 \Rightarrow 8$$

$$Q_1 = X_8 = 6.4 \text{ LBS}$$

7. (6 pts) Using the data from Problem 6, what percentile is the 8.0 lb baby?

$$P_K = \frac{\# \text{ VALUES } < 8.0}{\text{TOTAL}} \times 100 = \frac{25}{30} \cdot 100 = 83.33 =$$

83RD
PERCENTILE

ROUND TO NEAREST WHOLE
#

8. (8 pts) Which score has a better relative position, a score of 252 on a test for which $\bar{x} = 240$ and $s = 24$, or a score of 62.4 on a test for which $\bar{x} = 60$ and $s = 6$?

$$X = 252$$

$$Z = \frac{X - \bar{x}}{s} = \frac{252 - 240}{24} = \underline{\underline{0.50}}$$

$$X = 62.4$$

$$Z = \frac{62.4 - 60}{6} = \underline{\underline{0.40}}$$

SCORE OF 252 IS
BETTER
SINCE $Z = 0.50$
IS $>$ $Z = 0.40$

EXTRA CREDIT ON BACK



BONUS (10 points)



(5 pts) Elaine gets quiz grades of 79, 82, and 69. She gets a 65 on her final exam. Find the weighted mean if the quizzes each count for 10% and the final exam counts for 70% of the final grade.

$$0.10 (79 + 82 + 69) + 0.70 (65) = \underline{\underline{68.5}}$$

(5 pts) Suppose that all the values in a data set are converted to z-scores. Which of the statements below is true? (Circle your answer).

- A. The mean of the z-scores will be zero, and the standard deviation of the z-scores will be the same as the standard deviation of the original data values.
- B. The mean and standard deviation of the z-scores will be the same as the mean and standard deviation of the original data values.
- C. The mean of the z-scores will be 0, and the standard deviation of the z-scores will be 1.
- D. The mean and the standard deviation of the z-scores will both be zero.