Palestine Polytechnic University
Faculty of Applied Sciences

4507 - Introduction to Statistics

First Exam (30 points) **Sunday 6/3/2022** **50 Minutes**

Instructor: *Dr. Monjed H. Samuh*

Std. Name: Key Std. ID:

Q1]. . . [5 points] Which **scale of measurement** is most appropriate for the following variables:

1. Marital status of nurses in a hospital (Single, Married, Divorced, Widowed).

   Nominal.

2. Time it takes 10 people to complete a survey questionnaire.

   Ratio.

3. Rankings of golfers in a tournament.

   Ordinal.

4. Weights of selected cell phones.

   Ratio.

5. Religion (Muslim, Catholic, Other).

   Nominal.

Q2]. . . [2 points] For each of the following, identify which **sampling method** is used:

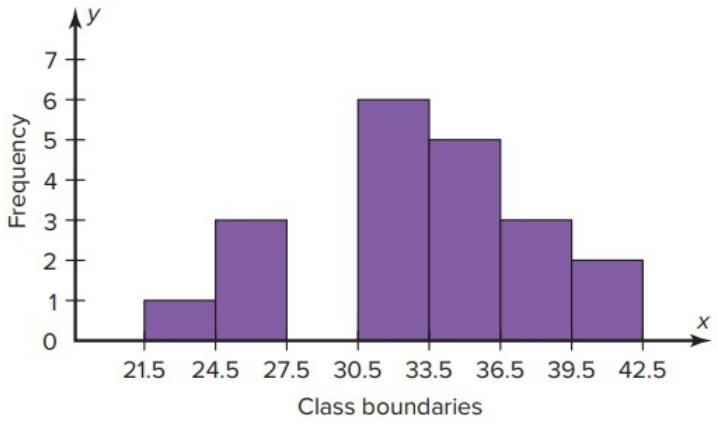
1. In a large school district, all teachers from two buildings are interviewed to determine whether they believe the students have less homework to do now than in previous years.

   Cluster Sampling.

2. Every 100th hamburger manufactured is checked to determine its fat content.

   Systematic Sampling.

Q3]. . . [10 points] Using the histogram shown here, do the following.



1. **(1 point)** How many values fall between 24.5 and 36.5? 14

2. **(1 point)** What **percentage** of values is greater than 30.5? $\frac{16}{20} \times 100\% = 80\%$

3. **(4 points)** Construct a **frequency distribution**; include **class limits**, **class frequencies**, **midpoints**, and **cumulative frequencies**.

Class Limit	Frequency (f_i)	Midpoint (m_i)	Cum. Freq.	$m_i f_i$
22 – 24	1	23	1	23
25 – 27	3	26	4	78
28 – 30	0	29	4	0
31 – 33	6	32	10	192
34 – 36	5	35	15	175
37 – 39	3	38	18	114
40 – 42	2	41	20	82
Total	20			664

(+1) (+1) (+1) (+1) (+1)

4. **(1 point)** Find the modal class. 31 – 33 OR 30.5 – 33.5 (+1)

5. **(3 points)** Find the mean.

$$\bar{x} = \frac{\sum m_i f_i}{\sum f_i} = \frac{664}{20} = 33.2$$

(+1) (+1½) (+½)

Q4]...[7 points] 10 people sign up for a weight-loss class and the amount of weight lost at the end of the two-month period (in pounds) is as follows:

$$3, 3, 4, 3, 10, 6, 5, 6, 3, 3.$$

Note that the sample mean is $\bar{X} = 5$ and the sample standard deviation is $S \approx 2.11$.

1. **(3 points)** Check this data set for outliers.

3, 3, 3, 4, 5, 5, 5, 6, 6, 10

$Q_1 = 3$ $Q_2 = 5$ $Q_3 = 6$ +1.5

$IQR = Q_3 - Q_1$

$= 6 - 3 = 3$

$(1.5)(IQR) = (1.5)(3) = 4.5$

$Q_1 - 1.5\,IQR = 3 - 4.5 = -0.5$ +½

$Q_3 + 1.5\,IQR = 6 + 4.5 = 10.5$ +½

$\Rightarrow$ No outliers. +½

2. **(2 points)** Find and interpret the percentile rank of 6.

Percentile rank of 6 $= \dfrac{7 + 0.5}{10} \times 100\% = 75\%$ +½ +½

75% of the people has lost at most 6 pounds. +½ +½

3. **(2 points)** Find and interpret the Z-score of 6.

$Z = \dfrac{X - \bar{X}}{S} = \dfrac{6 - 5}{2.11} \doteq 0.47$ +½ +½

The value 6 lies above the mean by 0.47 standard deviation. +½ +½

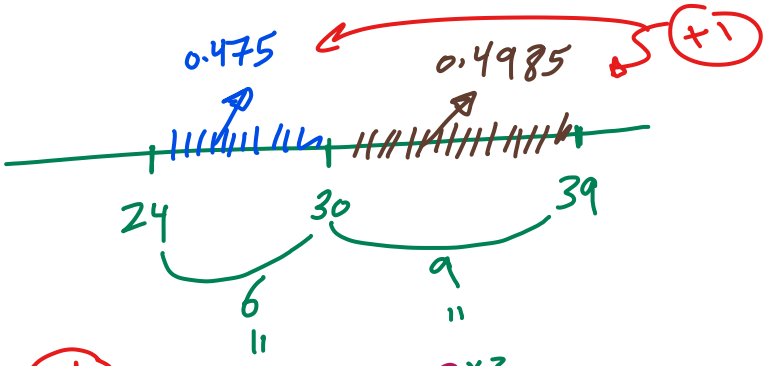
Q5]. . . [4 points] A sample of size 70 observations has mean 30 and standard deviation 3. Using the empirical rule,

1. **(2 points)** what can be said about the number of observations that lie outside the interval (24, 39)?

There are about 97.35% of the obs's lies within (24,39).

⇒ There are about 2.65% of the obs's outside (24,39)

⇒ About (0.0265)(70) ≅ 2 obs's lie outside the interval (24,39). +1



2. **(1 point)** what interval centered on the mean should contain about 68% of the sample?

one standard deviation. +½

(30−3, 30+3)

(27, 33) +½

Q6]. . . [2 points] If the mean of five values is 8.2 and four of the values are 6, 10, 7, and 12, find the fifth value.

$$\frac{6+10+7+12+X}{5} = 8.2 \quad +1$$

$$\Rightarrow \quad X = (8.2)(5) - (35) \quad +½$$

$$= 6 \quad +½$$

GOOD LUCK