BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MTH 23
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Exam 1
October 24, 2025

Name: KEY

Directions: Write your answers in the provided space. To get full credit you *must* show all your work. Simplify your answers whenever possible. Be certain to indicate your final answer clearly.

1. (20 points) For the following sample

1 2 4 6

compute

(a) (5 points) The sample mean $\bar{x}$.

$n = 4$

x	x^2
1	1
2	4
4	16
6	36
Σ 13	57

$$\bar{X} = \frac{\Sigma x}{n}$$

$$= \frac{13}{4}$$

$$\approx \boxed{3.25}$$

(b) (15 points) The sample standard deviation s.

$$s^2 = \frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1}$$

$$\frac{(\Sigma x)^2}{n} = \frac{(13)^2}{4} = \frac{169}{4} = 42.25$$

$$= \frac{57 - 42.25}{3}$$

$$= \frac{14.75}{3}$$

$$\approx 4.92$$

$$s = \sqrt{s^2}$$

$$\approx \sqrt{4.92}$$

$$\approx \boxed{2.22}$$

Let V = "likes Vanila" $P(V) = 0.55$

C = "likes Chocolate" $P(C) = 0.80$

$P(V \text{ given } C) = 0.60$

2. (20 points) A survey found that 55% of all the regular customers in an ice cream shop like vanilla ice cream, and 80% like chocolate. Of those who like chocolate, 60% also likes vanilla. If you walk into that store and encounter one of the regular customers what is the probability that

(a) (10 points) they like both chocolate and vanilla?

$$P(C \text{ and } V) = P(C) \cdot P(V \text{ given } C)$$
$$= 0.80 \times 0.60$$
$$= \boxed{0.48}$$

(b) (10 points) they like at least one of the flavors, chocolate or vanilla?

$$P(C \text{ or } V) = P(C) + P(V) - P(C \text{ and } V)$$
$$= 0.80 + 0.55 - 0.48$$
$$= \boxed{0.87}$$

3. (20 points) For the following data:

12, 17, 17, 17, 33, 35, 38, 38, 42, 43, 45.

Q_1 Q_2 Q_3

Lower half | Upper half

8 values ≤ 38

(a) (5 points) Find the mode.

Mode = 17

(b) (10 points) Find the median, and the first and third quartiles.

$n = 11$ $\quad \frac{n+1}{2} = \frac{11+1}{2} = \boxed{6}$

Median is the 6^{th} number $\quad Q_2 = \boxed{35}$

Q_1 = median of lower half = $\boxed{17}$

Q_3 = median of upper half = $\boxed{42}$

(c) (5 points) What is the percentile rank of 38?

There are 8 out of 11 values ≤ 32.

$$\frac{8}{11} \approx 73\%$$

The percentile rank of 38 is $\boxed{73}$.

4. (20 points) In a stack of selves I have 500 books. They are either in English or in Greek, and their content is either Math, Non Fiction other than math, or Fiction. The number of the books according their language and their category is shown in the table below

	Math	Non-Fiction	Fiction	Total
English	150	100	30	280
Greek	100	50	70	220
Total	250	150	100	500

If I pick up a book at random from that stack of selves what is the probability that the book is

(a) (5 points) A Greek book.

$$P(\text{Greek}) = \frac{220}{500} = 0.44$$

(b) (5 points) A Math book.

$$P(\text{Math}) = \frac{250}{500} = 0.50$$

(c) (5 points) A Greek book or a Math book.

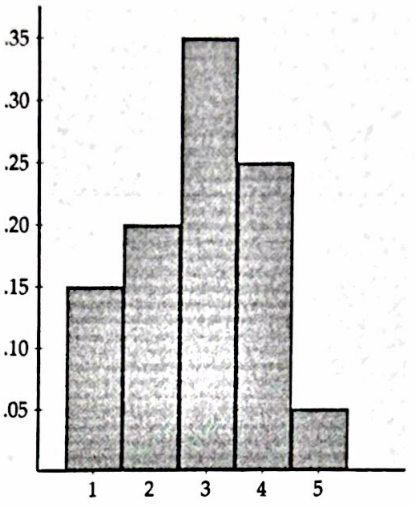
$$P(\text{Greek or Math}) = P(\text{Greek}) + P(\text{Math}) - P(\text{Greek and Math})$$

$$= \frac{220 + 250 - 100}{500} = \frac{370}{500} = 0.74$$

(d) (5 points) Given that the book was Greek, what's the probability that it was a Math book?

$$P(\text{Math given Greek}) = \frac{100}{220} \approx 0.45$$

5. (20 points) A box contains balls numbered 1 through 5 with relative frequency as shown below



(a) (7 points) A ball is drawn randomly from that box. What is the probability that its number is odd?

$$P(\text{odd}) = P(1 \text{ or } 3 \text{ or } 5)$$
$$= P(1) + P(3) + P(5)$$
$$= 0.15 + 0.35 + 0.05$$
$$= \boxed{0.55}$$

(b) (13 points) Given that the ball's number was odd, what is the probability that its number was 3?

$$P(3 \text{ given odd}) = \frac{P(3)}{P(\text{odd})} = \frac{0.35}{0.55} \approx \boxed{0.64}$$