

**BRONX COMMUNITY COLLEGE**  
of the City University of New York

**DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE**

MATH 23  
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Exam 2  
May 8, 2024

Name: \_\_\_\_\_

**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. The probability distribution of a discrete random variable  $X$  is given in the table below.

$x$	$P(x)$
0	0.40
1	0.15
2	0.25
3	0.20

- (a) Compute the expected value (the mean) of  $X$ .

- (b) Compute the standard deviation of  $X$ .



3. Let  $X$  be a random variable that represents the length of time it takes a student to complete an exam. It was found that  $x$  has an approximately normal distribution with mean  $\mu = 2.5$  hours and standard deviation  $\sigma = 0.8$  hours.
- (a) What is the probability that a randomly selected student takes at least 4.1 hours to complete the exam?

- (b) Suppose 25 students are selected at random. What is the probability that  $\bar{x}$ , the mean time of completing the exam for these 25 students, is not more than 2.3 hours?

4. Colette is self-employed, selling cosmetics at home parties. She wants to estimate the average amount a client spends per year at these parties. A random sample of 16 receipts had a mean of  $\bar{x} = \$340.70$  with a standard deviation of  $s = \$60.15$ . Find a 90% confidence interval for the mean amount  $\mu$  spent by all clients. Assume  $x$  has an approximately normal distribution.

5. Jorge lives in Pleasantville and hates banana splits. He can't believe that 75% of his fellow residents like that stuff. He decides to test the hypothesis  $H_0: p = 0.75$  with alternative hypothesis  $H_a: p < 0.75$ . In a random sample of 100 residents he finds that 73 like banana splits.
- Is this sufficient evidence to reject  $H_0$  at the level of significance  $\alpha = 0.05$ ?