BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 23 — Exam 2
Nikos Apostolakis — December 10, 2025

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 by:

x	5	10	20	25
$P(x)$	0.30	0.20	0.35	0.15

(a) Find the expected value $E(X)$.

(b) Find the variance σ^2 of X.

(c) Find the standard deviation σ of X.

2. 75% of the residents of Pleasantville like banana splits. If we randomly select 20 people from Pleasantville:
   (a) How many of those selected we expect to like banana splits?

   (b) What is the standard deviation of the number of those selected that like banana splits?

   (c) What is the probability that exactly 15 of the selected people like banana splits?

   (d) What is the probability that more than 13 but at most 18 of the selected people like banana splits?

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 $\mu = 2.4$ hours and standard deviation $\sigma = 0.8$ hours.

   (a) What is the probability that a randomly selected student finishes the exam within the allocated time of 3 hours?

   (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 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 μ 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 $H_0\colon\ p = 0.75$ with alternative hypothesis $H_a\colon\ p < 0.75$. 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 $\alpha = 0.05$?