

## Practice Problems for Test-2

1. Define the Binomial, Geometric, Poisson, Negative Binomial and Hypergeometric distributions.

2-A. A student is taking a multiple-choice quiz where each question has 4 options, and they guess randomly. What is the probability that they get their first correct answer on the third question?

2-B. A website receives an average of 12 customer inquiries per hour. What is the probability that at least an inquiry will be received in the two hours?

2-C. A baseball player has a 30% chance of hitting the ball each time they swing. How many hits on expectation are needed so that he gets the 4th hit?

2-D. A warehouse has a total of 100 laptops, 20 of which are defective. If a retailer randomly selects 10 laptops to sell, what is the probability that none of them are defective?

2-E. A company manufactures light bulbs, and each has a 2% chance of being defective. If a quality control test requires that the proportion of being defective is less than 3% in the sample. An inspector randomly selects 1000 bulbs. What is the probability that the company fails the test?

3. Let  $X$  be a continuous random variable with density function

$$f(x) = kx + x^2, \text{ for } 0 \leq x \leq 1.$$

(1) Find  $k$ .

(2) Find  $P(X \geq 1/2)$ .

(3) Find  $P(X > 1/3 | X \leq 1/2)$ .

4. A small cafe sells 0, 1, 2, or 3 cups of coffee to a random customer with the following probability distribution:

(1) Find  $p$ .

(2) Find the mean and variance of  $X$ .

<b>Cups Sold (<math>x</math>)</b>	<b>Probability <math>P(X = x)</math></b>
0	0.2
1	0.2
2	0.2
3	$p$

Table 1: Probability Distribution of Cups Sold