

HW 7

Group 1**Grade:**

Calamity Jane goes to the bank to make a withdrawal, and is equally likely to find 0 or 1 customers ahead of her. The service time of the customer ahead, if present, is exponentially distributed with parameter λ . What is the CDF of Jane's waiting time?

Group 2**Grade:**

A bus travels between the two cities A and B , which are 100 miles apart. If the bus has a breakdown, the distance from the breakdown to city A has a uniform distribution over $(0, 100)$. There is a bus service station in city A , in B , and in the center of the route between A and B . It is suggested that it would be more efficient to have the three stations located 25, 50, and 75 miles, respectively, from A . Do you agree? Why?

Group 3**Grade:**

The time X (in minutes) between customer arrivals at a bank is exponentially distributed with mean 1.5 minutes.

1. If a customer has just arrived, what is the probability that no customer will arrive in the next 2 minutes?
2. What is the probability that no customer will arrive within the next minute, given that no customer had arrived in the past minute?

Group 4**Grade:**

The random variable X has the probability density function

$$f(x) = \begin{cases} ax + bx^2 & 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

If $\mathbb{E}[X] = 0.6$, find

1. $\mathbb{P}(X < \frac{1}{2})$.
2. $\text{Var}(X)$.

Group 5**Grade:**

The annual rainfall (in inches) in a certain region is normally distributed with $\mu = 40$ and $\sigma = 4$. What is the probability that starting with this year, it will take more than 10 years before a year occurs having a rainfall of more than 50 inches? Suppose the rainfall in each year is independent of the rainfall in other years and the distribution of rainfall in each year is the same as in the present year.