Quiz 3

Student ID: Name:

1. X_1 and X_2 are independent exponential random variables, each with rate λ. The random variable Y is defined as $Y = \min(X_1, X_2)$. Please find $E[Y]$.

$$Y \sim Exp(\lambda + \lambda) = Exp(2\lambda)$$

$$E[Y] = \frac{1}{2\lambda}$$

2. Let $X \sim \text{Exponential}(\lambda)$. Use Chebyshev's inequality to find an upper bound of $P(|X - E[X]| \geq b)$.

Since $X \sim \text{Exponential}(\lambda)$, we have $E[X] = \frac{1}{\lambda}$ and $Var[X] = \frac{1}{\lambda^2}$.

Using Chebyshev's inequality, we have

$$P(|X - E[X]| \geq b) \leq \frac{Var(X)}{b^2}$$

$$= \frac{1}{\lambda^2 b^2}$$