

ELEG 3143 Assignment # 5

1. The discrete RV X has the following PMF

$$p_X(1) = 0.3, p_X(2) = 0.2, p_X(3) = 0.4, p_X(4) = 0.1.$$

- (a) Find the CDF.
- (b) Find $\mathbb{E}[X]$.
- (c) Find $\mathbb{E}[2X^2 + X]$.

2. Let X be the number of heads in four tosses of a fair coin.

- (a) What is the PMF of X ?
- (b) Find $\mathbb{E}(X)$
- (c) Find $\text{Var}(X)$.

3. A fair coin is tossed repeatedly until a tail comes up. If X tosses are needed, then the Casino pays the gambler $Y = X + 1$ dollars.

- (a) What is the PMF of X ?
- (b) What is the expected payout $\mathbb{E}(Y)$?

4. An urn contains 9 \$1 bills and 1 \$100 bill. Let the random variable X be the total amount when two bills are drawn from the urn without replacement.

- (a) What is the PMF of X ?
- (b) Find $\mathbb{E}(X)$.
- (c) Find $\text{Var}(X)$.

5. Consider a Poisson RV $X \sim \text{Poisson}(\lambda)$. Prove that $\mathbb{E}[X] = \lambda$.

6. Consider a geometric RV $X \sim \text{Geometric}(p)$. Prove that $\mathbb{E}[X] = \frac{1}{p}$.