Problem Set 2

ECN 301E - Fall 2024

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Question 1

Define the following terms in your own words.

a. Experiment and sample space
b. Random variable
c. Probability distribution
d. Cumulative probability distribution
e. Expected value and variance
f. Joint probability distribution
g. Marginal and conditional probability distributions
h. Covariance and correlation
i. Skewness and kurtosis

Question 2

Let Y denote the number of **heads** that occur when two coins are tossed. Assume the probability of a heads is 0.4 on either coin.

a. Derive the probability distribution of Y.
b. Derive the mean and variance of Y.

Question 3

The following table gives the joint probability distribution between employment status (Y) and college graduation (X) among those either employed or looking for work (unemployed) in the working-age population of Turkey.

	Unemployed $Y=0$	Employed $Y=1$	Total
Non-college grads $X=0$	0.026	0.576	0.602
College grads $X=1$	0.009	0.389	0.398
Total	0.035	0.965	1.000

a. Compute $E(Y)$.
b. Calculate $E(Y|X=1)$ and $E(Y|X=0)$.
c. Calculate the unemployment rate for college graduates and non-college graduates.
d. A randomly selected member of this population reports being unemployed. What is the probability that this worker is a college graduate? A non-college graduate?
e. Are educational achievement and employment status independent? Explain.

Question 4

Suppose X is a Bernoulli random variable with $P(X=1)=p$ and $P(X=0)=1-p$.

a. Find $E(X^4)$.
b. Suppose that $p=0.53$. Compute the mean, variance, skewness, and kurtosis of X.