

Math 360: Introduction to Probability and Statistics, Spring 2004, Section 01, CRV 71243

Homework 01. Due Thursday, 27 Jan 2005, 3pm PST. Late papers will not be accepted.

1. The table below gives a probability mass function for a random variable X .

x	0	1	2	3	4	5
p(x)	0.35	0.1	0.15	0.3	0.05	0.05

- Verify that the table does in fact define a probability mass function.
 - Find the mean.
 - Find the variance.
 - Find the standard deviation.
 - Sketch a graph of this probability mass function.
 - Find $P(X = 2)$.
 - Find $P(X > 2)$.
 - Find $P(X \leq 2)$.
2. A jar contains 6 fair coins and 2 biased coins. The two biased coins have a probability of heads of 0.90. We reach into the jar, pull out a coin, and flip it six times. Find the probability of flipping at least four Hs.
3. The Binomial pmf is used to model the number of successes in a sequence of independent trials, each having the same probability of success. For example, a parts supplier guarantees that only 1 out of every 400 parts he sells are defective. If we buy 20, what's the probability that no parts are defective? If we buy 5000, what's the probability of having no more than 5 defective parts? The Binomial pmf facts are on the handout and on pages 28-32 of the text.
4. The Poisson pmf is used to model random events occurring in sequence for a fixed duration. For example, when we are monitoring the number of arrivals into a line at the bank, we would use the Poisson to predict probabilities for number of arrivals. If the average arrival rate is 25 customers per hour, find the probability that we receive exactly 5 customers in a 12 minute period. Find the probability that we receive exactly 3 customers in a 12-minute period. Find the probability that we receive exactly 3 customers in a 10-minute period. Use the formulas on the handout.
5. The Geometric probability mass function is used to model the number of trials required to conduct until the first success occurs. For example, a certain product is effective 95% of the times it is used. Use the geometric pmf to determine the probability that the first failure occurs on the 10th try. Find the probability that the first failure occurs on or before the 10th try.

BONUS: In Problem 2, find the probability that the coin drawn is a biased coin, given that the result of the six flips is six heads.