

Math 365 Winter 2011 Exam 1 In-class Review WITH ANSWERS

An urn contains red, blue and green balls. There are a total of 30 balls in the urn.

1. A ball is chosen at random, let X be the color. How many of each color should be in the urn in order for X to have a Uniform distribution?
10 red, 10 blue, 10 green

2. Suppose there are 10 of each color and three balls are selected at random without replacement. What is the probability of:
 - (a) Selecting three different color balls?
0.2463

 - (b) Exactly two of the same color?
0.665

3. Three balls are chosen at random without replacement, let X be the number of green balls. Suppose there are ten of each color.
 - (a) How is X distributed?
Hypergeometric

 - (b) Find $P(X = 2)$.
0.222

 - (c) What is $E(X)$?
1

4. A ball is selected at random. Let $X = 1$ if it is blue and $X = 0$ otherwise. Suppose there are 10 of each color.
 - (a) How is X distributed?
This won't be on the test (the answer is Bernoulli)

 - (b) What is the p.m.f. of X ?

5. Bowl A contains three red and two white chips, and bowl B contains four red and three white chips. A chip is drawn at random from Bowl A and transferred to bowl B. Compute the probability of then drawing a red chip from bowl B.

0.575

6. A hospital obtains 40% of its flu vaccine from Company A, 50% from Company B, and 10% from Company C. From past experience, it is known that 3% of the vials from A are ineffective, 2% from B are ineffective, and 5% from C are ineffective. The hospital tests five vials from each shipment. If at least one of the five is ineffective, find the conditional probability of that shipment's having come from C.

0.1780
Hint: You need to find the probability of at least one ineffective if from Company A, B or C ($1 - P(0 \text{ defective})$).

7. If $P(A) = 0.8$, $P(B) = 0.5$ and $P(A \cup B) = 0.9$ are A and B independent? mutually exclusive? why?

They ARE independent since $P(A \cap B) = P(A) \cdot P(B) = 0.4$.

They are NOT mutually exclusive since $P(A \cap B) \neq 0$.

8. Let X equal the larger outcome when a pair of four-sided dice is rolled. The p.m.f. of X is

$$f(x) = \frac{2x-1}{16}, \quad x = 1, 2, 3, 4.$$

Find the mean, variance and standard deviation of X .

$$\mu = 3.125$$

$$\sigma^2 = 0.859$$

$$\sigma = 0.927$$