

Problem: A toy manufacturer makes red and blue marbles, which are sold in packages of five. Suppose that the color composition of the packages is distributed as follows.

50% of packages have all blue marbles

30% of packages have 3 blue and 2 red marbles

20% of packages have 1 blue and 4 red marbles

Suppose that you choose a package of marbles at random from the manufacturer's warehouse. Unaware of the contents of the package, you select one of the five marbles at random.

a. What is the probability that you select a blue marble?

Answer:_____.

b. Given that you selected a blue marble, what is the probability that all the other marbles in the package are blue?

Answer:_____.

Problem: A man purchases a package of 10 off-brand golf balls. Assume that each golf ball is defective with probability .2, independently of the other balls.

a. What is the probability that the package contains exactly 3 defective balls?

Answer:_____.

b. What is the expected value and variance of the number of defective balls in the package?

Answers:_____.

c. Given that the first 2 balls in the package are defective, what is the probability that 4 of the 10 balls are defective?

Answer:_____.

Problem: Suppose for the purposes of this problem that each of the four seasons (Spring, Summer, Autumn, and Winter) are of equal duration.

a. Let α_n be the probability that, in a class of n students, each student was born during a different season. Find α_3 and α_5 .

$\alpha_3 =$ _____ $\alpha_5 =$ _____

Now suppose that we interview students, one after the other, until the first time we find a student born in the Spring.

b. Let β_k be the probability that we interview k students before finding the first student who was born in the Spring. Give a general formula for the probabilities $\beta_k, k \geq 0$.

Answer:_____.

c. If each student interviewed is paid \$1, what is the probability that the interview process costs \$4 or more?

Answer:_____.

d. State any assumptions that you made in answering part b above.