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Q1:

What is the size of the sample space?

With order mattering:

The sample size is 9: BB,BR, BW, RR, RB, RW, WW, WB and WR

In this case, since we are not looking at the acorns, order does not matter:

The sample size is 6: BB, BR, BW, RR, RW and WW

Q2:

Given the scenario description, how many ways are to there to collect two acorns of the *same species*?

3: BB, RR and WW

Q3:

Given the scenario description, how many ways can you collect two acorns of *different species*?

3: BR, BW and RW

Q4:

What is the probability that the acorn in your *left pocket* is *Q. alba*?

P(W) = 1/3

Q5:

What is the probability that the acorn in your *right pocket* is *Q. macrocarpa*?

P(B) = 1/3

Q6:

If you already know that the acorn in your left pocket is *Q. alba*, what is the probability

that the acorn in your *right pocket* is also *Q. alba*?

P(W) = 1/3

Q7:

What is the probability that both acorns are *Q rubra*?

P(RR) = P(R)x P(R) = 1/9, the probability of the intersection of two independent events is the product of their individual probabilities

Q8:

What is the probability that you collected exactly one each of *Q. alba* and *Q. rubra*?

2 x P(WR) = 2x1/3x1/3 = 2/9, order matters, WR is different from RW

Q9:

What is the probability that the acorn in your *left* pocket is *Q. alba* and you have an acorn of *Q. rubra* in your *right* pocket?

P(WR) = P(W)P(R) = 1/9

Q10: Consider a Poisson distribution with λ=6

Which of the following is the size of the sample space of this distribution?

* 10
* 11
* 0
* 2
* 6
* ∞

The sample space, the number of trials of a Poisson distribution, is infinite

Q11: Consider a Binomial distribution with n=10 and p=0.6.

Which of the following is the size of the sample space of this distribution?

* 10
* 11
* 0
* 2
* 6
* ∞

n is the number of statistically independent trials and so the sample size of this distribution is 10

Q12: Which common characteristics of the Binomial and Poisson distributions make them good models for counts?

They are discrete models that use integers for sample sizes. A Binomial distribution describes the number of successes out of a fixed number of trials or sample size, each with an equal probability for success where each trial is binary, success or failure, presence or absence. A Poisson distribution is used to model probability of event occurrence in a time or space interval with unlimited trials or sample space.

Q13: Describe a scenario in which a Binomial distribution may be a better count model than a Poisson distribution.

A Poisson distribution is used to model probability of event occurrence in a time or space interval with unlimited trials or sample space. This is not applicable in examples such as having a system of 5 road graders where the probability that a grader will malfunction in 900 hrs. is 0.0594. A Binomial Distribution would be used in this case because the number of trials, sample space is fixed at 5 and the probability of malfunction is 0.0594 for each trial. The probability of two of the five machines would malfunction in 900hrs would be computed by the PMF of the Poisson distribution and the probability that no more than two of the five machines would malfunction in 900 hrs. would be computed by the CDF of the Poisson Distribution (CEE260/MIE273, Prof. Oke, M3b).