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Q1 (2 pts.): Choose the best words or phrases to fill in the blanks: A probability distribution is a map from the (a) **events** to the (b) **likelihood**.

Q2 (2 pts.): How many possible outcomes are there (i.e. what is the sample space) if you flip two coins sequentially: a penny and a quarter? Assume that the two coins each have a head and a tail you care about order the probability of heads or tails is about 0.5 for each coin.

There are 8 possible outcomes highlighted in yellow:

	PH	**PT**	**QH**	**QT**
PH	PHPH	PHPT	PHQH	PHQT
PT	PTPH	PTPH	PTQH	PHQT
QH	QHPH	QHPT	QHQH	QHQT
QT	QTPH	QHQT	QTQH	QTQT

Q3 (2 pts.): How many possible outcomes are there (i.e. what is the sample space) if you flip two quarters at the same time? Assume that the two coins are indistinguishable i.e. you just want to know the number of heads or tails for each possible outcome. each has a head and a tail. the probability of heads or tails is about 0.5 for each quarter.

There are 4 possible outcomes highlighted in yellow:

	H	**T**
H	HH	HT
T	TH	TT

Q4: How many outcomes are there if you flip a penny three times? If you care about the order flips, how many possible events are there in the sample space?

There are 8 possible outcomes highlighted in yellow below.

	H	**T**	**TT**	**HH**	**TH**
HH	HHH	HHT	HHTT		
TT	TTH				

Q5: Are these combinations, or permutations?

These are permutations because we care about the order

Q6: Now suppose you don't care about the order, and you simply want to know about the number of heads when you flip the penny three times. How many possible events are in the sample space?

There are 8 possible outcomes highlighted in yellow:

	H	**T**	**TT**	**HH**	**TH**
HH	HHH	HHT	HHTT	HHHH	HHTH
TT	TTH	TTT	TTTT	TTHH	TTTH
H	HH	HT	HTT	HHH	HTH
T	HT	TT	TTT	HHT	TTH

Q7: Are these combinations, or permutations?

These are combinations because the order is unimportant.

Q8: What is the size of the sample space?

The sample space is 3 because there is the Bur oak (Quercus. macrocarpa), Northern Red Oak (Q. rubra), and White oak (Q. alba) acorns.

Q9: Given the scenario description, how many ways are there to collect two acorns of the same species?

There are three possibilities highlighted in yellow below:

	BU	**NRO**	**WO**
BU	BU/BU	BU/NRO	BU/WO
NRO	NRO/NU	NRO/NRO	NRO/WO
WO	WO/BU	WO/NRO	WO/WO

Q10: Given the scenario description, how many ways can you collect two acorns of different species?

There are 6 possibilities highlighted in yellow below:

	BU	NRO	WO
BU	BU/BU	BU/NRO	BU/WO
NRO	NRO/NU	NRO/NRO	NRO/WO
WO	WO/BU	WO/NRO	WO/WO

Q11: What is the probability that the acorn in your left pocket is Q. alba?

There is a 1/3 probability that the acorn in my left pocket is Q.alba

Q12: What is the probability that the acorn in your right pocket is Q. macrocarpa?

There is a 1/3 probability that the acorn in my right pocket is Q. macrocarpa.

Q13: 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?

The probability of the acorn in my right pocket being Q. Alba is 1/3.

Q14: What is the probability that **both** acorns are Q rubra?

The probability that both acorns are Q. rubra is 1/9.

Q15: What is the probability that you collected exactly one each of Q. alba and Q. rubra?

The probability that I collected exactly one of each is 1/9.

Q16: 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?

The probability of having Q. Alba in my left pocket is 1/3 and the probability of Q. Rubric in the right pocket is 1/3, with a probability of 1/9th all together.

Q17: Which of the following is the size of the sample space of this Poisson distribution?

∞

Q18: Which of the following is the size of the sample space of this Binomial distribution?

11

Q19: Describe a characteristic that is common to both the Binomial and Poisson distributions that makes them good models for counts.

A common characteristic to both the Binomial and Poisson distributions is that each individual event can have a binary outcome which makes it useful for presence and absence.

Q20: Hypothesize a scenario in which a Binomial distribution may be a better count model than a Poisson distribution.

When you have a limited number of plots in your sampling using binomial distribution is better.