Reading questions 5

Olivia Dinkelacker

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

- **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.**

The sample space is 8, because we care about the order > distinct events.

- **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 have a head and a tail**
  - **the probability of heads or tails is about 0.5 for each quarter**.
  -

The sample space is 3, because we do not care about the order > H/T and T/H are equivalent events.

- **Q4 (2 pts.): How many outcomes are there if you flip a penny three times? If you care about the order of flips, how many possible events are there in the sample space?**

The sample space is 8.

HHH, HTT, HHT, HTH, THH, THT, TTH,TTT

- **Q5 (1 pt.): Are these combinations, or permutations?**

Permutations

- **Q6 (2 pts.): 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?**

The sample space is 4.

TTT, TTH, THH, HHH, HHT, HTT

- **Q7 (1 pt.): Are these combinations, or permutations?**

Combinations

- **Q8 (2 pts.): What is the size of the sample space?**

Combinations > 6

Bur, red, White
BR, BB, BW, RR, RW, WW

Q9 (2 pts.): Given the scenario description, how many ways are to there to collect two acorns of the same species?

One.

- **Q10 (2 pts.): Given the scenario description, how many ways can you collect two acorns of different species?**

3 > Count as equivalent events

- **Q11 (1 pt.): What is the probability that the acorn in your left pocket is Q. alba?**

1/3

- **Q12 (1 pt.): What is the probability that the acorn in your right pocket is Q. macrocarpa?**

1/3

- **Q13 (2 pts.): 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?**

0.3 multiplied by 0.3 = 0.09 or 1/3 multiplied 1/3 = 1/9

- **Q14 (2 pts.): What is the probability that both acorns are Q rubra?**

The same: 0.3 multiplied by 0.3 = 0.09 or 1/3 multiplied 1/3 = 1/9

- **Q15 (2 pts.): What is the probability that you collected exactly one each of Q. alba and Q. rubra?**

0.3 multiplied by 0.3 = 0.09 or 1/3 multiplied 1/3 = 1/9

- **Q16 (2 pts.): 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?**

0.3 multiplied by 0.3 = 0.09 or 1/3 multiplied 1/3 = 1/9

- **Q17 (1 pt.): Which of the following is the size of the sample space of this Poisson distribution?**
    - ∞

- **Q18 (2 pts.): Which of the following is the size of the sample space of this Binomial distribution?**
  - 11 (n+1)

- **Q19 (2 pts.): Describe a characistic that is common to both the Binomial and Poisson distributions that makes them good models for counts.**

They are discrete distributions that can only represent positive values. Binomial distributions includes multiple Bernoulli trails with binary outcome. Poisson distributions are appropriate for things that occur at a random rate.

- **Q20 (2 pts.): Hypothesize a scenario in which a Binomial distribution may be a better count model than a Poisson distribution.**

Binomial distribution is better to use if we have a smaller sample size (upper limit), and for example want to calculate the probability of success for encountering two birds on 10 plots. A poisson distribution can be used when there is a big sample space (infinite sample space).