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HW 6

Question 1. B.

This code was written by someone interested in using stan to modeling over distributed count data. I'm saving this code because most of my data from Reynolds creek which relates to biodiversity is in the form of count data. I think it would be interesting to use a technique like this is compare species richness and evenness across the elevation and precipitation gradient in the watershed, plus between shrub communities.

https://discourse.mc-stan.org/t/conway-maxwell-poisson-distribution/2370

https://arxiv.org/abs/1612.06618

Question 2.

Borge's story was about a world with unending forking paths which were all alternate dimensions. This concept is now related to modern statistics because people use it to refer to potential comparisons which could be made in datasets. The concept of the garden of forking paths is related to p-hacking, where researchers test multiple comparisons to explain data values based on an overall idea. If you make enough comparisons, it's likely that you'll find a statistically significant relationship. There are too many forking alternate hypotheses--this results in researchers exploring data but only reporting significant findings.

Question 3.
Given: P(Earth|Land)= 0.23
Likelihood: P(Land|Earth) = 0.3
Prior: P(Earth) = 0.5
Data likelihood(marginal) P(Land) = (.3+1)/2 = .65
P(Earth|Land)= 0.23 = (.3*.5)/.65

Question 4.
A. The probability that the panda is from species A with a first birth of twins is 0.33.
Posterior P(A|twins)→ find it
Prior: P(A)= 0.5
Data likelihood P(twins|A): 0.1
Marginal Likelihood P(twins): (0.1+0.2)/2 = 0.15
P(A|twins) = (0.1*0.5)/0.15= **0.33**

B. The probability that the same panda mom from part A, is species A with a second birth of a single panda is 0.36.
Posterior P(A|single AFTER twins)→ find

Prior P(A)= 0.5 …..*OR 0.33 bc of previous part of question???*
Data likelihood P(single AFTER twins|A)= (0.1*0.9)= 0.09
Marginal likelihood P(single AFTER twins) = ((0.1*0.9)+(0.2*0.8))/2 = 0.125
Posterior P(A|single AFTER twins)= (0.09*0.5)/0.125 = **0.36**

C. 1. The probability that the panda is species A given the test is correct is 0.55.

Posterior P(A|test correct)→ find
Likelihood P(test|A) = 0.8
Marginal P(test) = (0.8+0.65)/2 = 0.725
Prior P(A) = 0.5
Posterior P(A|test correct) = (0.8*0.5)/0.725 = **0.55**

C. 2. The probability that the panda is species A given the test is correct and our prior information about the births is….
P(A|test and births) = P(A|single AFTER twins) x P(A|test correct) = 0.36 x 0.55 = **0.198**
OR
Posterior P(A|test and births)→ find
Prior P(A) = 0.5
Likelihood P(test and births|A) = 0.55 x 0.36 = 0.198
Marginal P(test and births) = ((0.8+0.65)+0.125)/2 = 0.7875
Posterior P(A|test and births) = (0.5*0.198)/0.7875 = **0.124**