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HW5

Question 1
b. Stan code: https://discourse.mc-stan.org/t/poisson-and-negative-binomial-regression/1184
The user wrote this code to fit count data with a binary covariate and a categorical covariate using both the Poisson and negative binomial mode. I have count data that I will try to fit using a negative binomial and also have some categorical and binary covariates that I can include in my model. The user also included offsets which I may or may not need to include depending on my data and if area of my samples actually makes a difference.

Question 2
Choice 1: Dall et al. 2005. "Information and its use by animals in evolutionary ecology." Are foraging animals Bayesians?

Foraging animals are Bayesians because they use prior information either from learning personally or socially from other individuals in their group to help them make decisions and assess the quality of foraging habitat. This choice in foraging habitat is not random but instead is based on their prior information about what makes good foraging habitat.

Question 3
Given the Earth 70% water, it then must be 30% land, and Mars is 100% land, we know P(Land|Earth)=0.3. Our prior is P(Earth)=0.5 and the marginal likelihood is P(land)= (0.3+1)/2=0.65
So P(Earth|Land)=0.23 = (0.3*0.5)/0.65

Question 4

Species A has twins=0.1
Species B has twins=0.2

A. Probability Panda Mom is species A given first birth of twins:
P(Species A|twins)= (0.1*0.5)/(0.2+0.1)/2
= 0.05/0/15
= 0.33

B. Probability Panda Mom is species A given second birth is single and first birth twins:
P(species A|twins then single)= (0.1*0.9)*0.5/((0.1*0.9)+(0.2*0.8)/2)
=0.045/0.125
= 0.36

C. Panda species test: correctly identifies species A=0.8, correctly identifies species B=0.65

a. Ignore births: P(species A|tested positive for species A)= 0.8*0.5/((0.8+0.35)/2)

= 0.4/0.575

= 0.696

b. Using birth data:

P(SpA|test +,births)= 0.5*(0.696+0.36) / ((0.1*0.9)+(0.2*0.8)/2) +(0.8+0.35)/2)

=0.528 / 0.125+0.575

=0.754