**Ecological Models and Data Homework # 2 – Math Games**

**DUE: in class, Thursday, January 30**

For his first homework assignment, Nate, a 2015 Bio 133 student, flipped a single quarter 200 times. The result of his coin flip was 110 heads and 90 tails. His interpretation of the data was that, although the probability seemed to be leveling off at about 55% heads, he must not have collected enough data, because the probability of obtaining heads should be 50%.

1. Use the Binomial distribution to calculate the probability of obtaining Nate’s data (200 trials and 110 events) for two models
   1. Probability of heads = 0.5
   2. Probability of heads = 0.55
2. Calculate the posterior probabilities of each of the two above models, assuming they are the only two possible models and you have no informative prior information (HINT: Remember, your prior model values should sum to 1).
3. Compare the results of the two models in A using the ratio of the two likelihoods. Which model is more likely and by about how much? Compare these results to the relative probabilities of the two models calculated in B.
4. Use Bayes Theorem to read Nate’s mind. In order to conclude that he had not collected enough data, how strong would his prior belief have to be that his quarter was *typical*? In other words, what is his implied prior probability in the first model, where P(heads) = 0.5?

