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CS109

Section #6 Concept Check Solutions

1 Lecture 17, 2-14-20: Beta

1. Suppose you have a coin where you have no prior belief on its true probability of heads p. How can you model this belief as a beta distribution?
2. Suppose you have a coin which you believe is fair, with "strength" α. That is, pretend you've seen α heads and α tails. How can you model this belief as a Beta distribution?
3. Now suppose you take the coin from the previous part and flip it 10 times. You see 8 heads and 2 tails. How can you model your posterior belief of the coin's probability of heads?

1. $Beta(1, 1)$ is a uniform prior.
2. $Beta(\alpha + 1, \alpha + 1)$. This is our prior belief about the distribution.
3. $Beta(\alpha + 9, \alpha + 3)$

2 Lecture 18, 2-18-20: Central Limit Theorem

1. What is the distribution (with name and parameter(s)) of the average of n i.i.d. random variables, X_1, ..., X_n, each with mean μ and variance σ^2?

1. According to the central limit theorem, this can be modeled as $N(\mu, \sigma^2/n)$.