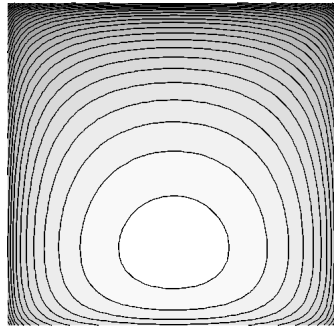# Hints for exercises for Thursday, first hour

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Variational approximation

1. An independent distribution has two parameters, say, α and β. Write up a 2×2 table of probabilities for this distribution and compute its surprisal values. You can work in natural units (i.e., ln) instead of bits (i.e., $\log_2$) if you want to make the calculus easier. A picture of the situation is shown on the right.

2. You can answer this question without doing any computations at all.

Competitive prediction   Take the logarithm of the likelihood ratio; use the independence of the coin flips; then use the weak law of large numbers.

A substitution cipher   You can attack this cipher in several ways:

1. Use the frequencies of the cryptocharacters.

2. Start with the shortest words.

3. Start with the most frequent words.

4. Look foor tell-tale bigrams like DD and LL.