Information Theory: Hints

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Probability threshold sets (Cover and Thomas, Exercise 3.5)

1. Probabilities must sum up to 1.

2. Start with the central limit theorem.

Source coding (Cover and Thomas, Exercise 3.7)

1. Count the ways you can insert black pixels into the sequence and control for the fact that the black pixels can be permuted. The exact answer is 166,751.

2. Which table entries are used most often?

3. You can, for instance, let S be the random number of black pixels in the sample and compute some bound on the probability that

$$|S - 0.5| > 2.5.$$

For a sanity check, you should compare your answer to the exact probability, which is about 0.0017.