HW3

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Problem 1:

Show that satisfied when ,

subject to the constraint: .

Proof: (Using Lagrange multiplier)

The equality constraint function can be expressed as:

Let us define a new function

We will find the partial derivative of L.

To show that is given by Equation 1, all the params are irrelevant.

For any :

And,

Now we will solve the equality system:

As requested.

Problem 2:

Solution:

1. To make a uniform distribution over the space of all K-dimensional categorical distributions, we will need that where is a constant.

Hence, for we will obtain that: .

1. A uniform has the same value for each of its entries, .

A sampled from a uniform distribution is not necessarily distributed uniformly itself, it means the probability of obtaining any from the distribution is the same.

1. A prior usage might result in a noise reduction of the data from a prior knowledge information we already have on the problem. When choosing the parameters, in a sense, we are defining how we expect the samples to be sampled.