Problem 6: Estimating the parameter of a uniform r.v.

(3/5 points)

The random variable X is uniformly distributed over the interval $[\theta, 2\theta]$. The parameter θ is unknown and is modeled as the value of a continuous random variable Θ, uniformly distributed between zero and one.

1. Given an observation x of X, find the posterior distribution of Θ. Express your answers below in terms of θ and x. Use 'theta' to denote θ and 'ln' to denote the natural logarithm function. For example, $\ln(\theta)$ should be entered as 'ln(theta)'.

   For $0 \leq x \leq 1$ and $x/2 \leq \theta \leq x$, $f_{\Theta|X}(\theta \mid x) =$ 1/(theta*ln(2)) ✔

2. Find the MAP estimate of Θ based on the observation $X = x$ and assuming that $0 \leq x \leq 1$. Express your answer in terms of x.

   For $0 \leq x \leq 1$, $\hat{\theta}_{\mathrm{MAP}}(x) =$ x/2 ✔

3. Find the LMS estimate of Θ based on the observation $X = x$ and assuming that $0 \leq x \leq 1$. Express your answer in terms of x.

   For $0 \leq x \leq 1$, $\hat{\theta}_{\mathrm{LMS}}(x) =$ x/(2*ln(2)) ✔

4. Find the linear LMS estimate $\hat{\theta}_{\mathrm{LLMS}}$ of Θ based on the observation $X = x$. Specifically, $\hat{\theta}_{\mathrm{LLMS}}$ is of the form $c_1 + c_2 x$. Find c_1 and c_2 .

   $c_1 =$ 0 ✖

   $c_2 =$ 1/(2*ln(2)) ✖

You have used 2 of 2 submissions

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