CSE 546 HW #1

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(1) MLE and bias–variance tradeoff

(a) If we draw $x_1, \ldots, x_n \sim \text{uniform}(0, \theta)$ for some positive parameter θ, then

$$\mathbb{P}(x_1, \ldots, x_n \mid \theta) = \begin{cases} \left(\frac{1}{\theta}\right)^n & \text{if } x_1, \ldots, x_n \in [0, \theta] \\ 0 & \text{else} \end{cases}$$

We can see that the likelihood increases as θ decreases, given that all points drawn still lie in $[0, \theta]$, so we conclude that the MLE is $\hat{\theta} = \max(x_1, \ldots, x_n)$.