p-values

1. Suppose $X \sim \text{Unif}[0, \theta]$. We'd like to test the following hypotheses:

$$H_0 : \theta \leq 1 \qquad \text{vs .} \qquad H_1 : \theta > 1$$

Let δ_c be the procedure that rejects H_0 if $X \geq c$ for some $c > 0$. It might useful to recall that if $X \sim \text{Unif}[a, b]$, then $F_X(x) = \begin{cases} 0 & x < a \\ \frac{x-a}{b-a} & a \leq x \leq b \\ 1 & x > b \end{cases}$

(a) For each possible value of $X = x$, find the form of the p-value if x is observed.

(b) Briefly interpret your p-value from (a), and discuss why the p-value "makes sense".