Hypothesis Testing - Likelihood Ratio Warm-Up

Adapted from Rice Exercise 9.4

Suppose X is a random variable that can take one of the values in the set $\{1, 2, 3, 4\}$. X follows one of two distributions, with probability mass functions given in the table below. We want to conduct a test of the hypotheses

H_0: the first distribution is correct

H_A: the second distribution is correct

x	$f_X(x)$ for H_0	$f_X(x)$ for H_A	Likelihood Ratio
1	0.2	0.1	
2	0.3	0.4	
3	0.3	0.1	
4	0.2	0.4	

1. Fill in the table above with values of the likelihood ratio corresponding to each possible value of x.

2. Suppose we take a sample and we observe $x = 2$. What is the p-value for the likelihood ratio test?

3. In this example, what are the possible p-values for the likelihood ratio test? (Find the p-values for the test if we observe $x = 1$, $x = 3$, and $x = 4$)