## 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)