**4.7 Exercises**

**1.**

**4.**

**(a).**

Since the set of observations X is uniformly distributed on [0, 1], and we are using a 10% range, that means every X in the distribution are equally probable to be chosen. So, the fraction of available information used is 10% on average.

**(b).**

From uniformly distribution we can know that the fraction is the intersection of two observations. So the probability = X1 length \* X2 length = 0.01, the fraction of available information used is 1% on average.

**(c).**

Applying the rule above, when p=100, 0.1^p × 100 = 0.1^100 × 100 of the observations are available.

**(d).**

When p is large there are very few observations which to build test near the given test observation. As the rule above, the fraction of points near a test observation can becomes exponentially smaller when p becomes larger. Because being near in every dimension to a point is a strict condition and this gets less and less likely as the number dimensions increases.

**(e).**

Backstepping from the rule above, we can know that:

If p=1, length of each side = 0.1^1 = 0.1

If p=2, length of each side = 0.1^ (1/2) = 0.32

If p=1, length of each side = 0.1^ (1/100) = 0.98