

## Math 302 Assignment 2

This assignment is due on Wed. Sept. 28.

1.  $2/3$  of the people in the National Park of Bandrika are tourists. A tourist will answer your question for directions correctly  $3/4$  of the time, while a local will only answer it correctly  $1/10$  of the time.

(a) If you ask a randomly selected person for directions, what is the probability the directions will be correct?

(b) If the directions turn out to be correct, what is the probability the directions were given by a local Bandrikian?

2. An urn contains 6 blue balls and 4 red balls. Balls are drawn one at a time until the urn is empty.

(a) Find the probability that the first red ball is selected on the 3rd draw.

(b) Find the probability that the last ball selected is red.

(c) Find the probability that exactly 2 blue balls are selected in the first 4 draws.

3. True or False. If True, give a proof. If False, give a counter-example. We say an event  $A$  is interesting iff  $P(A)$  is not 0 or 1. Otherwise the set is uninteresting.

(a) Any two disjoint sets are independent.

(b) If  $A$  is uninteresting it is independent of any event  $B$ .

(c) If  $A$  and  $B$  are interesting events and  $A \subset B$ , then  $A$  and  $B$  are dependent events.

4. The colour of a person's eyes is determined by a pair of gene types each of which can be  $a$  or  $A$ . If the pair type is  $aa$ , the eyes are blue, and if they are  $aA$  or  $AA$ , then they are brown (the order of the gene types is irrelevant). A child independently receives one gene type from each parent and the type is chosen at random from the parent's two types.

You and your spouse have brown eyes, one blue-eyed-daughter and are expecting a son.

(a) Find the probability your son has brown eyes.

(b) If your son has brown eyes and marries a blue-eyed girl find the probability that their first child (your grandchild) has blue eyes.

**Hint:** For (a) take the sample space to be  $S = \{aa, aA, AA\}$  the set of possible gene types of your son.

Here are some practice problems not to be handed in, but try them before the first midterm.

p. 53 #35,43

p. 102-106 # 3.1, 3.5, 3.10, 3.11, 3.14(a), 3.20, 3.28, 3.51, 3.53, 3.57, 3.60(a,b)

A stock price will either increase by \$1 or decrease by \$1 each day. It has a 60% chance of doing the same thing tomorrow as it did today and a 40% chance of doing the opposite. (Think of tossing a coin each day with probability .6 of Heads and reverse the increment of last day's change iff the toss is a Tail). Assume that  $S_n$  is the stock price on day  $n$  and that we have seen  $S_1 = 16$  and  $S_2 = 17$ .

(a) Find  $P(S_4 = 17)$ , that is the probability the stock price on day 4 is \$17.

(b) If the stock price on day 5 was \$18, find the probability the price on day 4 was \$17.

**Hint:** Draw a graph showing the possible stock prices.