W02 Homework B

01

Multiplication - drawing two hearts

Two cards are drawn from a standard deck (without replacement).

(a) What is the probability that both are hearts?

(b) What is the probability that both are 4?

02

Syntax errors vs. logic errors, Part A

A computer program may contain a syntax error or a logic error or both types of errors. The probability that a program has both types of error is 0.16. The probability that a program has a syntax error given that it has a logic error is 0.4. The probability that a program has a logic error given that it has a syntax error is 0.5.

Find the probability that a particular program has at least one type of error.

03

Bayes' Theorem - Inferring die from roll

A bag contains one 4-sided die, one 6-sided die, and one 12-sided die. You draw a random die from the bag, roll it, and get a 4.

What is the probability that you drew the 6-sided die?

04

Syntax errors vs. logic errors, Part B

A computer program may contain a syntax error or a logic error or both types of errors. The probability that a program has both types of error is 0.16. The probability that a program has a syntax error given that it has a logic error is 0.4. The probability that a program has a logic error given that it has a syntax error is 0.5.

Are the events “program has a syntax error” and “program has a logic error” independent? Justify your answer.

05

Pairwise independent, not mutually independent: three coin flips

Flip a coin three times in sequence. Label events like this:

- A – exactly one heads among first and second flips
- B – exactly one heads among second and third flips
- C – exactly one heads among first and third flips

Verify that A, B, C are *pairwise* independent but not actually *mutually* independent.

06

Homework part errors

A homework problem has 10 different parts. You submit and are told that 4 of the 10 answers you provided are incorrect, but you are not told which parts are incorrect.

(a) What is the probability you will have gotten the first part correct and the second part incorrect? Draw a tree diagram.

(b) Suppose the 4 errors have occurred in the first 6 parts. In this case, how many possible arrangements are there for these 4 errors?

(c) What is the probability the 4 errors occurred in the first 6 parts?

07

Counting passwords

Suppose a password must be created using 5 letters and 6 digits. (There are 26 letters, a-z, and 10 digits, 0-9.) No letter or digit may be repeated.

(a) How many unique passwords can be created if the letters must come first and the digits last?

(b) How many unique passwords can be created if the 5 letters and 6 digits can appear in any order?

08

Drawing balls of distinct color

A bin contains 3 green and 4 yellow balls. Two balls are drawn out.

What is the probability that they are different colors?

09

Wisconsin flag 2 of 3 days

A kindergarten class hangs a random state flag (50 flags) on the wall every day. What is the probability that two days out of three given days have Wisconsin's flag?

10

Inclusion-exclusion reasoning

Suppose $P[A] = 0.4$ and $P[B] = 0.7$. Show that $0.1 \leq P[AB] \leq 0.4$.