

HOMEWORK 3

ELEMENTARY STATISTICS & INFERENCE (STAT:1020; BOGNAR)

1. Based on long-run relative frequencies, approximately 51% of all births in the U.S. are boys (i.e. $P(B) = 0.51$, $P(G) = 0.49$). Assume independence.
 - (a) If a woman has 3 children, find the probability that she has all boys.
 - (b) If a woman has 3 children, find the probability that she does not have all boys.
 - (c) If a woman has 3 children, find the probability that the first child is a boy, while the last 2 children are girls.
 - (d) If a woman has 3 children, find the probability that she has 1 or more boys.
2. Suppose that 4% of desktop computers run the Linux operating system (L). Suppose 2 computers are randomly selected (*assume independence*).
 - (a) Find the probability that neither computer is running Linux.
 - (b) Find the probability that the first computer runs Linux (L_1) *or* the second computer runs linux (L_2).
 - (c) Find the probability that exactly one of the computers runs Linux.
3. It is known that 72% of adults suffer from vision problems. It is also known that 65% of adults suffer from vision problems *and* wear corrective lenses (i.e. eye glasses, contacts). Given that a randomly selected adult suffers from vision problems, find the probability that he/she wears corrective lenses.
4. Suppose a box contains 12 silver coins (S) and 3 gold coins (G). If you randomly select 2 coins *without* replacement, determine the probability that the first coin is silver (S_1) *and* the second coin is gold (G_2).
5. Suppose a die is rolled. Consider the following events:
$$\begin{aligned} A &= 2, 4 \text{ or } 6 \text{ is rolled} \\ B &= 1, 2 \text{ or } 5 \text{ is rolled} \\ C &= 3 \text{ or } 5 \text{ is rolled} \end{aligned}$$
 - (a) Are A and B mutually exclusive? Why?
 - (b) Are A and C mutually exclusive? Why?
 - (c) Find $P(A|B)$
 - (d) Find $P(B \cup C)$.
6. Suppose events A and B are mutually exclusive where $P(A) = 0.5$ and $P(B) = 0.2$. What is $P(A|B)$?