HOMEWORK 2 **NAME:** ______________________________

BIOSTATISTICS (STAT:3510; BOGNAR)

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1. Textbook 2.6.4

2. Textbook 2.6.7

   (a)

   (b)

   (c)

3. Textbook 3.2.2

   (a)

   (b)

   (c)

   (d)

4. Textbook 3.3.2

   (a)

   (b)

   (c)

   (d)

5. Suppose a 6-sided die (with sides labeled 1, 2, 3, 4, 5, 6) is rolled 2 times.

   (a) Let A denote the event that a 1 is obtained on the first roll, and let B denote the event that an even is obtained on the second roll. Find the probability that events A and B both occur. In other words, find $P(A \cap B)$.

   (b) Let A denote the event that a 1 is obtained on the first roll, and let B denote the event that an even is obtained on the second roll. Find the probability that A occurs, B occurs, or both A and B occur. In other words, find $P(A \cup B)$.

6. Suppose you randomly select 2 chips *with* replacement from a bowl containing 3 red (R) and 5 white (W) chips. Let R_1 denote the event that a red chip is obtained on the first draw, let R_2 denote the event that a red chip is obtained on the second draw. Find $P(R_1 \cap R_2)$.

7. 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. *Use complement rule.*

   (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 exactly 1 boy. *Hint:* $P\left[(B_1 \cap G_2 \cap G_3) \cup (...) \cup (...)\right]$.

(e) If a woman has 3 children, find the probability that she has 1 or more boys. *Use the complement rule.*

8. Suppose that 4% of desktop computers in a large hospital run the Linux operating system (L).

   (a) Suppose 2 computers are randomly selected (*assume independence*). Find the probability that neither computer is running Linux, i.e. find $P(L_1^c \cap L_2^c)$.

   (b) Suppose 2 computers are randomly selected (*assume independence*). Find the probability that the first computer runs Linux (L_1), the second computer runs linux (L_2), or both run Linux. In other words, find $P(L_1 \cup L_2)$.

   (c) Suppose 2 computers are randomly selected (*assume independence*). Find the probability that exactly one of the computers runs Linux. *Hint:* $P\left[(L_1 \cap L_2^c) \cup (...)\right]$.

   (d) Suppose computers are repeatedly selected (assume independence). Find the probability that the 4th selected computer is the first one running Linux. In other words, find $P(L_1^c \cap L_2^c \cap L_3^c \cap L_4)$.

   (e) Suppose 5 computers are randomly selected (*assume independence*). Find the probability that 1 or more run linux. *Use the complement rule.*