Homework must be completed on this form. Write your answers in the provided space only. You may use an iPad if you wish.

1. Textbook 13.30

    (a)

    (b)

    (c)

2. 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 $P(R_1 \cap R_2)$.

3. Suppose a die is repeatedly rolled. Find the probability that a 1 is obtained for the first time on the 10th roll. *Hint: To get a 1 for the first time on the 10th roll, you must get a non-one on the 1st roll (1_1^c), a non-one on the second roll (1_2^c),..., a non-one on the 9th roll (1_9^c), and a one on the 10th roll (1_{10}).*

4. 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.

5. 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), or both run Linux.

   (c) Find the probability that exactly one of the computers runs Linux.

6. Suppose that 80% of computers use an Intel processor.

   (a) Suppose 2 computers are randomly selected (*assume independence*). Find the probability that the first computer, second computer, or both has an Intel processor, i.e. find $P(I_1 \cup I_2)$.

(b) Suppose 2 computers are randomly selected (*assume independence*). Find the probability that exactly 1 has an Intel processor.

(c) Suppose computers are repeatedly selected at random (*assume independence*). Find the probability that the 10th computer is the first without an Intel processor.

(d) Suppose 4 computers are randomly selected (*assume independence*). Find the probability that 1 or more contain an Intel processor.

7. A slot machine has 3 wheels. Each wheel has 10 symbols, and each symbol is equally likely when the wheel is spun (assume the wheels act independently of each other). The middle wheel has 1 bell among its 10 symbols, while the left and right wheels have 4 bells each.

(a) You win the jackpot if the wheels show all bells. What is the probability of winning the jackpot on any given spin?

(b) Find the probability of obtaining exactly 2 bells on any given spin.

(c) What is the probability that you get a bell on the first wheel *or* third wheel? In other words, find $P(B_1 \cup B_3)$.