The below are in-class exercises designed to help solidify your understanding of the material covered in the notes. They will also aid you in completing some homework problems. Please work together with your group to complete as many of these problems as you can.

PN refers to the online textbook by Pishro-Nik available here. Please do not look at the solutions until after you have completed the problem or received hints from me.

Exercise 1

PN 3.1.6, problem 2 (no need to write full PMF for part (d))

Exercise 2

PN 3.1.6, problem 4

Exercise 3

PN 3.1.6, problem 7 (**Hint:** Use the law of total probability.)

Exercise 4

PN 3.1.6, problem 8 (optional)

Exercise 5

PN 3.2.5, problem 2

Exercise 6

PN 3.2.5, problem 4

Exercise 7

PN 3.2.5, problem 6 (**Note:** This problem is similar to HW1, problem 3.)

Exercise 8

PN 3.2.5, problem 7

Exercise 9

PN 3.2.5, problem 8

Exercise 10

You are dealt 14 cards from a standard 52-card deck. What is the probability of receiving a hand with 2 spades, 3 hearts, 4 diamonds, and 5 clubs?

Exercise 11

An internet message consists of 4 header packets followed by 96 data packets. Unfortunately, a faulty router randomly re-orders all the packets. What is the probability that the first header packet received is the tenth packet to arrive?

Exercise 12

Suppose there is an urn with two balls marked 0 and 1. Let X_1 be the number on the first ball drawn and X_2 be the number on the second ball. Determine whether X_1 and X_2 are independent and/or identically distributed if

(a) the balls are drawn *with* replacement.

(b) the balls are drawn *without* replacement.

Exercise 13

A coin is tossed n times. Define a *run* as a sequence of throws resulting in the same outcome. For example, the sequence $HHTHTTH$ has 5 runs. Find the expected number of runs when

(a) the coin is fair (i.e., $P(H) = P(T) = 0.5$).

(b) the coin is biased with $P(H) = p$.