

Math 186, Winter 2020, Prof. Tesler
Homework #3, Due Wednesday January 29, 2020

Please present your solutions in the order the problems are listed.

Larsen & Marx **Sixth Edition:**

2.7# 4, 14

3.2# 4, 6, 12

3.3# 4, 11, 13, 15 (In #15, assume the CDF formula also holds at $x = 0$.)

3.4# 3, 8, 5, 10, 11, 14 (Problem #8 is needed for #5, so do #8 before #5.)

3.5# 4, 8(c,d), 18

and the problems below: H-301, H-302

Problem H-301. On Mars there are 669 Martian solar days per year (ignoring leap years).

- (a) In a group of 8 Martians, chosen at random, what is the probability that at least two share a birthday? Give your answer to 4 decimals.
- (b) At what number of Martians is there approximately a 40% chance that at least two of them share a birthday? Use the formula for estimating this on the “birthday problem” slides.

Problem H-302.

- (a) If w is a string of English letters A–Z (all uppercase for the purposes of this problem), let w^r denote the reverse of w ; (TRAIN)^r=NIART. A *palindrome* is a string that is its own reversal: $w = w^r$. For example, BZRZB is a palindrome of length 5. We are not concerned with whether it is an actual English word. Find a formula for the number of palindromes of length k . You will need to treat odd ($k = 2m + 1$) and even ($k = 2m$) lengths differently.
- (b) If w is a DNA sequence (in the letters A, C, G, T), let $w^\#$ denote the reverse complement (change $A \leftrightarrow T$ and $C \leftrightarrow G$ and reverse the order of the letters); for example, (ATAGC)[#]=GCTAT. A *DNA palindrome* is a DNA sequence that is its own reverse complement: $w^\# = w$. For example, ACTAGT is a DNA palindrome of length 6. Find a formula for the number of DNA palindromes of length k . Again, you will need to treat odd and even lengths differently.