Math 186, Winter 2008, Prof. Tesler
Homework #3, Due Monday January 26, 2009

Larsen & Marx **Fourth Edition**:
2.6# 10, 22, 27, 36, 44, 53
2.7# 4, 13, 14
3.2# 4, 6, 10
3.3# 4, 11, 13, 15
and the problems below: H-5, H-6

Problem H-5. On Mars there are 669 Martian solar days per year (ignoring leap years).

(a) What is the chance that 5 Martians, chosen at random, all have different birthdays?

(b) At what number of Martians would there be about a 65% chance that at least two of them share a birthday? Use the formula for estimating this on the "birthday problem" handout.

Problem H-6.

(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; $(\text{TRAIN})^r$=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 n. You will need to treat odd ($n = 2m + 1$) and even ($n = 2m$) 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, $(\text{ATAGC})^\#$=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 n. Again, you will need to treat odd and even lengths differently.