

**HW1, for MATH441, STAT461, STAT561, due September 1st**

1. How many ways are there to rearrange the letters in *ALBUQUERQUE*?
2. (a) How many license plates are possible that have two digits (0–9) followed by *UNM* followed by another two digits? Assume that digits are allowed to repeat.  
  
(b) How many license plates are possible that have three digits followed by three letters (with 26 letters in the alphabet)?  
  
(c) How many license plates are possible that have three digits and three letters in any order?
3. Consider passwords with 10 characters where each character is either an upper case or lower case letter (numbers and special characters are not allowed).  
  
(a) How many such passwords are there that have five lower case and five upper case letters?  
(b) How many such passwords are there that have at least one lower case and at least one upper case letter?
4. A department has 10 full, 8 associate, and 7 assistant professors.  
  
(a) How many ways can a committee with two of each type of professor be formed?  
(b) Suppose one of the full professors is married to one of the associate professors. How many ways can a committee be formed with two of each type of professor but the two people in the married couple cannot both serve on the committee?
5. On a piano, there are twelve notes per octave. A *scale* can be considered a selection of notes from an octave where you can ignore the order that the notes are selected. You can think of these notes as just the set  $\{1, 2, \dots, 12\}$ . If we ignore the starting note for the scale, how many five-note scales are there? How many seven-note scales? (For musicians, ignoring the starting note is like considering A minor and C major to be the same scale because they have exactly the same notes).
6. How many solutions are there to
$$x + y + z = 11$$
when  $x, y, z$  are integers and  $x, y, z \geq 0$ ?
7. Use the binomial theorem to examine  $(x - 2y)^6$ .
8. (For graduate students.) Expand the expression  $(x + 2y - z)^4$  using the multinomial theorem.