MATH 174, LECTURE 14

1. Return quizzes (29 total, 60.7%, 6 perfects; 6 A's, 1 B, 4 C's, 2 D's, 16 F's)
2. Discuss "review" web links.
3. Go over homework questions.
4. Homework: page 280, numbers 10(a), 11(a), 15, 17, 19, 20
   page 293–295, numbers 8, 9, 11(a,b,c), 14, 26, 29, 31
   Two Quizzes: One from Web Review, Thursday (10/25)
5. **Counting:**
   - Subject matter of Chapter 6.
   - Today: Counting Elements of a List
     The Mulitplication Rule
     Permutations
6. **Examples:** (1) Bill read a chapter that began on page 75 and ended on page 100. How many pages did he read?

   (2) How many even numbers are there in the set $\{100, 102, 104, \ldots, 200\}$?
7. **Theorem 6.1.1:** If k and n are integers with $k \leq n$, then there are $\boxed{n - k + 1}$ integers from k to n.
8. **Examples:** (3) page 280, number 18

   (4) page 280, number 12(a),(b) (Does (a) this agree with the theorem?)

   (5) page 280, number 16

   (6) If year 1 A.D. was the first year of the first century, what will be the first year of the 25^{th} century?
9. **Examples:** (1) A crate contains 24 boxes of cookies. Each box contains 12 oreo cookies. How many oreo cookies are in the crate?

   (2) Each person in a company is assigned a password consisting of 5 letters followed by 2 digits (repetitions allowed). How many different passwords are possible?
10. **Theorem 6.2.1 (The Multiplication Rule):** If an operation consists of k steps and

    the first step can be performed in n_1 ways,

    the second step can be performed in n_2 ways (regardless of how the first step was performed),

    $\vdots$

    the k^{th} step can be performed in n_k ways (regardless of how the preceeding steps were performed),

    then the entire operation can be performed in $n_1 n_2 \ldots n_k$ ways.
11. **Further Examples:** (3) Suppose the password is two have no letter or digit repeated. How many different passwords would be possible?

    (4) How many integers are there with exactly 3 digits? (Do two ways.)

    (5) How many three digit numbers are there with no two digits the same?

    (6) page 293, number 10

    (7) page 294, number 19(c)
12. **Definition:** A *permutation* of a set of objects is an ordering of the objects.

13. **Examples:** (1) The permutations of $\{\text{Jill}, \text{Rob}\}$ are "Jill Rob" and "Rob Jill".

    (2) The permutations of $\{a, b, c\}$ are abc, acb, bac, bca, cab, and cba.

14. **Theorem 6.2.2:** For every integer $n \geq 1$, the number of permutations of a set with n elments is
$$\boxed{n \times (n-1) \times (n-2) \times \cdots \times 2 \times 1 = n!}.$$

15. **Further Examples:** (3) How many different ways can the letters in SIX be arranged in a row?

    (4) How many different ways can the letters in FOUR be arranged in a row?

    (5) What if we require the two vowels "O" and "U" be next to each other?

    (6) How many different ways can we arrange three letters in a row using the letters in FOUR? (Does this example belong here?)

    (7) How many different ways can we arrange two letters in a row using the letters in FOUR? (Does this example belong here?)

    (8) Jane has six different colored beads and wants to use them to make a necklace (with the beads equally spaced apart). How many different necklaces can she make?