MATH 174, LECTURE 16

1. Return quizzes (28 total, 81.43%; 13 A's, 5 B's, 4 C's, 1 D, 5 F's)
   (28 total, 96.25%; 23 A's, 5 B's)
2. Homework: pages 320–322, numbers 1(a), 5, 6(a,b,c), 15, 23
   page 329, numbers 10, 11, 14
   Quiz: Tuesday (11/06)
3. **Definition and Notation:** Let n and r be nonnegative integers with $r \leq n$. An *r-combination* of a set of n elements is a subset of r of the n elements. The symbol $\binom{n}{r}$ (read "n choose r") denotes the number of r-combinations that are possible to form from a given set of n elements.
4. **Examples:** (1) If a committee is to consist of 3 people from among Jill, Bill, Jan, and Dan, how many such committees are possible? What does this have to do with the above definition?

   (2) What is the value of $\binom{4}{2}$? Do by exhaustion and without exhaustion (there are 12 ways of arranging two elements from four in a row - so why is the anwer 6?).

   (3) What is the value of $\binom{8}{3}$? (Do 3 out of 8 ordered in a row first.)
5. **Theorem 6.4.1:** $\displaystyle\binom{n}{r} = \frac{n(n-1)\cdots(n-r+1)}{r!} = \frac{n!}{r!(n-r)!}$.
6. **Examples:** (1) What is the value of $\binom{10}{3}$?

   (2) page 320, number 6(d)

   (3) page 321, number 14

   (4) page 329, number 12

   (5) page 329, number 13
7. **FOIL method and beyond (and simpler).** Explain the binomial theorem.
8. **Some Identities**
$$\binom{n}{r} = \binom{n}{n-r} \qquad \text{and} \qquad \binom{n+1}{r} = \binom{n}{r} + \binom{n}{r-1}$$
9. **Pascal's triangle**
10. **Patterns**
    - symmetry
    - first and second element of a row
    - sum of a row