Last name _____

First name _____

LARSON—MATH 350—CLASSROOM WORKSHEET 12
Binomial Theorem.

Review

- What is an *experiment*, *sample space* S, *event* E, and the *probability* $P(E)$ of event E?
- What can we say about $P(E)$?
- Find the number of different possibilities for the birthdays of n people.
- Find the number of ways that n people can have different birthdays.
- Find the probability that n people have all different birthdays.
- Find the probability that at least one pair among n people have the *same* birthday.

1. (**Pigeonhole Principle**) 26 darts hit a 5 in. by 5 in. dart board. Why must some pair of darts be withing 1.5 in. of each other?

2. Multiple out $(x+y)^2$ and simplify.

3. Multiple out $(x+y)^3$ and simplify.

4. Every term can be written in the form $c_{i,j}x^iy^j$ (where i and j are non-negative integers, and $c_{i,j}$ is the coefficient of the term). What is relationship between i and j?

5. Can you explain where $c_{i,j}$ comes from?

6. Expand, if possible, $(x+y)^4$ without actually multiplying.

7. What is the *Binomial Theorem*?

8. Consider $(x+y)^{100}$. What is the $c_{57,j}x^{57}y^j$ term (what is j and what is $c_{57,j}$)?

9. Expand $(1+(-1))^4$ using the binomial theorem—do not evaluate the binomial coefficients, but otherwise simplify.

10. Expand $(1+(-1))^n$ using the binomial theorem—do not evaluate the binomial coefficients, but otherwise simplify.

11. If you rearrange you get a result we've seen before. What is it?