Math 150 Extra Credit - due Tuesday, October 28th

Pascal's Pizza

1. If we use bacon and pepperoni only:
   (a) How many 1-topping pizzas can we make? List the possibilities.
   (b) How many 2-topping pizzas can we make? List them.
   (c) How many 0-topping pizzas can we make?

2. Now suppose that we can use bacon, pepperoni, and pineapple only:
   (a) How many 1-topping pizzas can we make? List the possibilities.
   (b) How many 2-topping pizzas can we make? List them.
   (c) How many 3-topping pizzas can we make?

3. Complete the following chart by listing and counting the possibilities.

	Number of pizzas possible with					
Ingredients	0 topping	1 topping	2 toppings	3 toppings	4 toppings	5 toppings
1						
2						
3						
4						
5						

4. Often the table you filled in above is arranged a bit differently, as below, where the top 1 counts the number of 0-topping pizzas that can be made if 0 toppings are available. Complete the first 6 rows of this triangle, which is called Pascal's Triangle.

1

1 1

1 2 1

1 3 3 1

Do you see some symmetry in this triangle? Describe it.

5. From your results:
   (a) How many 2-topping pizzas are possible if 5 ingredients are available?
   (b) How many 3-topping pizzas are possible if 5 ingredients are available?
   (c) Explain why these two answers are related.
   (d) What does this have to do with the symmetry you observed above?