1: How many bit strings are there of length five or less, not counting the empty string?

2: How many strings of seven lowercase English letters are there

(a) if letters can be repeated?

(b) if no letter can be repeated?

(c) that start with z, if letters can be repeated?

(d) that start with z, if no letter can be repeated?

(e) that start or end with the letters bo (in that order), if letters can be repeated?

3: How many different functions are there from a set with 8 elements to sets with the following numbers of elements?

(a) 2

(b) 3

4: A bowl contains 5 red balls and 5 blue balls. A woman selects balls at random without looking at them.

(a) How many balls must she select to be sure of having at least four balls of the same color?

(b) How many balls must she select to be sure of having at least three blue balls?

5: Find the value of each of these quantities.

(a) $P(5, 3)$

(b) $P(6, 5)$

(c) $P(8, 5)$

6: Find the value of each of these quantities.

(a) $C(5, 0)$

(b) $C(5, 3)$

(c) $C(8, 4)$

7: How many permutations of the letters $ABCDEFGH$ contain

(a) the string ED?

(b) the strings BA and FGH?

(c) the strings CAB and BED?

(d) the strings BCA and ABF?

8: The row of Pascal's triangle containing the binomial coefficients $\binom{10}{k}$, $0 \leq k \leq 10$, is: 1 10 45 210 252 210 120 45 10 1. Use Pascal's identity to produce the row immediately following this row of Pascal's triangle.

9: Prove that if n and k are integers with $1 \le k \le n$ then $k\binom{n}{k} = n\binom{n-1}{k-1}$,

(a) using a combinatorial proof.

(b) using an algebraic proof based on the formula for $\binom{n}{r}$.