

Names: _____

CMPSCI 240 Discussion #2: Fun With Zip Codes

David Mix Barrington
13 February 2009

The U.S. Postal Service assigns a five-digit **zipcode** to every post office in the country. A zipcode consists of five decimal digits, that is, a string of length five over the alphabet $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$. In this exercise we will exercise our new skills in combinatorics by counting various subsets of the set of zipcodes. The answer to each question is a number, but please give a clear indication of how you reached your number and why you believe it to be correct.

1. How many total zipcodes are there, from 00000 to 99999?
2. How many zipcodes have their digits in order, as in 13579 or 22477?
3. How many zipcodes have their digits in order with no digit repeated?
4. How many zipcodes have no digit repeated?

5. How many zipcodes either start with 7, end with 7, or both?

6. How many zipcodes have exactly two 3's?

7. How many zipcodes have every digit a prime number?

8. How many zipcodes both have their digits in order and represent an even integer, such as 23378?

9. How many zipcodes, viewed as integers, are divisible by 25?

10. How many zipcodes are palindromes (are the same written backward, like 34743)?

11. How many zipcodes are full houses viewed as poker hands (two of one digit, three of another)?