

CS161 Spring12 homework 7

name:

id:

In the following questions there are always 26 letters (a-z) and 10 digits (0-9). **Identifiers** start with a letter, followed by letters or digits. **Passwords** are strings of letters and digits. When appropriate, state which rule you used, show the formula you used to derive your answer.

1. How many functions are there from letters to digits?

10^{26} product rule

2. How many one to one functions are there from digits to letters?

$26 \cdot 25 \cdot \dots \cdot 17 = \frac{26!}{16!}$ product rule

3. How many 3 character identifiers are there?

$26 \cdot (26+10) \cdot (26+10)$ product and sum rule

4. How many 3 character passwords are there with at least one digit?

$36^3 - 26^3 = 29080$ product rule

5. At least how many cards are needed so that three are of the same suit

9 (2 suit1, 2 suit2, 2 suit3, 2 suit4, plus 1 of any suit)
pigeon hole principle

6. How many positive integers less than 1000 are divisible by 7?

$\text{floor}(999/7) = 142$ pigeon hole principle

7. How many positive integers less than 1000 are divisible by 7 or 11?

$\text{floor}(999/7) + \text{floor}(999/11) - \text{floor}(999/77) = 142 + 90 - 12$
inclusion exclusion rule

8. At least how many people are needed such that at least two have a specific birthday (e.g. the 4th of July)?

That is a trick question: unbounded, because all people drawn can be born on other days.