Cryptographic passports & biometrics, summer 2009
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11. Exercise sheet
Hand in solutions until Monday, 13 July 2009.

Any claim needs a proof or argument. Answer in complete sentences and your own words. A verbatim quote is never a complete answer.

Exercise 11.1 (Fingerprints). (12 points)

Analyze your own fingerprints. As a basis consider the webpage `http://www.brazoria-county.com/sheriff/id/fingerprints/id~ncic.htm` and its subpages.

(i) Classify each of your fingers into one of the categories (according to the FBI NCIC fingerprint classification): $\boxed{5}$

- plain arch (`AA`),
- tented arch (`TT`),
- ulnar loop (`01, ..., 49`),
- radial loop (`51, ..., 99`),
- plain whorl (inner:`PI`, meeting:`PM`, outer:`PO`),
- central pocket whorl (inner:`CI`, meeting:`CM`, outer:`CO`),
- double loop whorl (inner:`DI`, meeting:`DM`, outer:`DO`),
- accidental whorl (inner:`XI`, meeting:`XM`, outer:`XO`),
- missing (`XX`), scarred or mutilated (`SR`), unable to classify (`UC`).

Start with your right thumb through to your right little finger and then continue from your left thumb to your left index finger.

My pattern is something like: 11 TT 03 04 03 05 55 TT 04 06.

(ii) Compare your pattern with the average values for arches (5%), loops (65%) and whorls (30%). $\boxed{3}$

(In the tutorial we'll put together all our findings.)

(iii) Give a brief description (in your own words) for each of the preceding classes. [Consider number of deltas, or describe them as "looking like a combination of"..., or think of a question like what would be a loop with 0 ridges between delta and core?] $\boxed{4}$

Exercise 11.2 (Historical Development).   (8 points)

Pick a country of your choice – other than the U.S. – who maintains an electronic database for fingerprints. Answer the following questions citing appropriate sources.

| 2 | (i) Since when are fingerprints recorded digitally?

| 2 | (ii) Which system was used to classify them originally? – Which system is used now?

| 2 | (iii) Who is recorded in the database?

| 2 | (iv) Who has access to the database?

Exercise 11.3 (Further Biometric Systems).   (10 points)

Apart from the Identification by Fingerprint consider the following further technologies: Iris Recognition, Face Recognition, Speaker Verification. Pick one of them and answer the following questions.

| 3 | (i) Think of a situation where the system of your choice is superior to all the others (including fingerprints).

| 3 | (ii) What information would you store? The complete picture/sound or only certain characteristics? Be specific about your ideas.

| 2 | (iii) How should then – in the identification process – an actual measurement be compared to the data in the database?

| 2 | (iv) Find ways to fool the system and think of a tools to prevent that.