Solutions

Each answer shows the steps, then the **result**.

2.1

- a **serial** file keeps records in the **order they were added** (unsorted)
- a **sequential** file keeps them **sorted by a key field**

2.2

- a **random (direct-access)** file

2.3

- it turns a **record key** into an **address/slot** where the record is stored

2.4

- when **two different keys** hash to the **same address/slot**

3.1

- `45 MOD 10 = 5`
- `23 MOD 10 = 3`
- `30 MOD 10 = 0`

3.2

- `35 MOD 10 = 5`, but slot 5 is **taken** by `45`
- linear probing tries the **next slot** (slot 6), and stores `35` there (the first free slot, wrapping if needed)

3.3

- advantage: very **fast direct lookup** by key
- disadvantage: reading in **key order** is harder, and collisions must be handled (space may be wasted)

3.4

- a **random (direct-access)** file using a **hash** of the account number
- because it gives near-instant lookup of a single record without searching the whole file