

**This is CS50.**

cs50.brianyu.me

# Week 7

- SQL
  - CREATE TABLE
  - INSERT
  - SELECT
  - UPDATE
  - DELETE
  - Indexes
  - SQL Injection
  - Race Conditions

**What questions do you have?**

# Today

SQL

SQL and Python

Lab

PART ONE

**SQL**

# books

id	title	author	year

```
CREATE TABLE books (  
  id INTEGER,  
  title TEXT,  
  author TEXT,  
  year NUMERIC,  
  PRIMARY KEY(id)  
);
```



# ratings

book_id	rating	votes

# ratings

book_id	rating	votes

Foreign Key

```
CREATE TABLE ratings (  
  book_id INTEGER,  
  rating REAL,  
  votes INTEGER,  
  FOREIGN KEY(book_id) REFERENCES books(id)  
);
```

```
INSERT INTO books  
(title, author, year)  
VALUES ("Emma", "Jane Austen", 1815);
```

```
SELECT * FROM books  
WHERE author = "J.K. Rowling";
```

```
UPDATE ratings  
SET rating = 4.2  
WHERE book_id = 28;
```

```
DELETE FROM books  
WHERE title = "Fahrenheit 451";
```

# Multiple Tables



# Students

- People
- Classes
- Who are the instructors of each class?
- Who are the students in each class?

```
CREATE TABLE people (  
    id INTEGER,  
    name TEXT NOT NULL,  
    PRIMARY KEY(id)  
);
```

```
CREATE TABLE courses (  
    id INTEGER,  
    code TEXT NOT NULL,  
    title TEXT NOT NULL,  
    PRIMARY KEY(id)  
);
```

```
CREATE TABLE students (  
    person_id INTEGER NOT NULL,  
    course_id INTEGER NOT NULL,  
    FOREIGN KEY(person_id) REFERENCES people(id),  
    FOREIGN KEY(course_id) REFERENCES courses(id)  
);
```

```
CREATE TABLE instructors (  
    person_id INTEGER NOT NULL,  
    course_id INTEGER NOT NULL,  
    FOREIGN KEY(person_id) REFERENCES people(id),  
    FOREIGN KEY(course_id) REFERENCES courses(id)  
);
```

```
wget https://cs50.brianyu.me/students.db
```

# Exercise

Write a SQL query to answer the following question:

What is Alice's student id?

# Exercise

Write a SQL query to answer the following question:

What is the course title for CS51?



# Exercise

Write a SQL query to answer the following question:

What are the course codes and titles for all of the CS courses?

Assume that all CS courses have a course code that begins with 'CS'.

# Exercise

Write a SQL query to answer the following question:

How many courses are there?

# Exercise

Write a SQL query to answer the following question:

How many students are taking CS50?

# Exercise

Write a SQL query to answer the following question:

What are the names of all of the instructors? Generate a table with all instructors' names and the course they teach.

# Exercise

Write a SQL query to answer the following question:

What are the names of all of the students taking CS50?

PART TWO

# SQL and Python

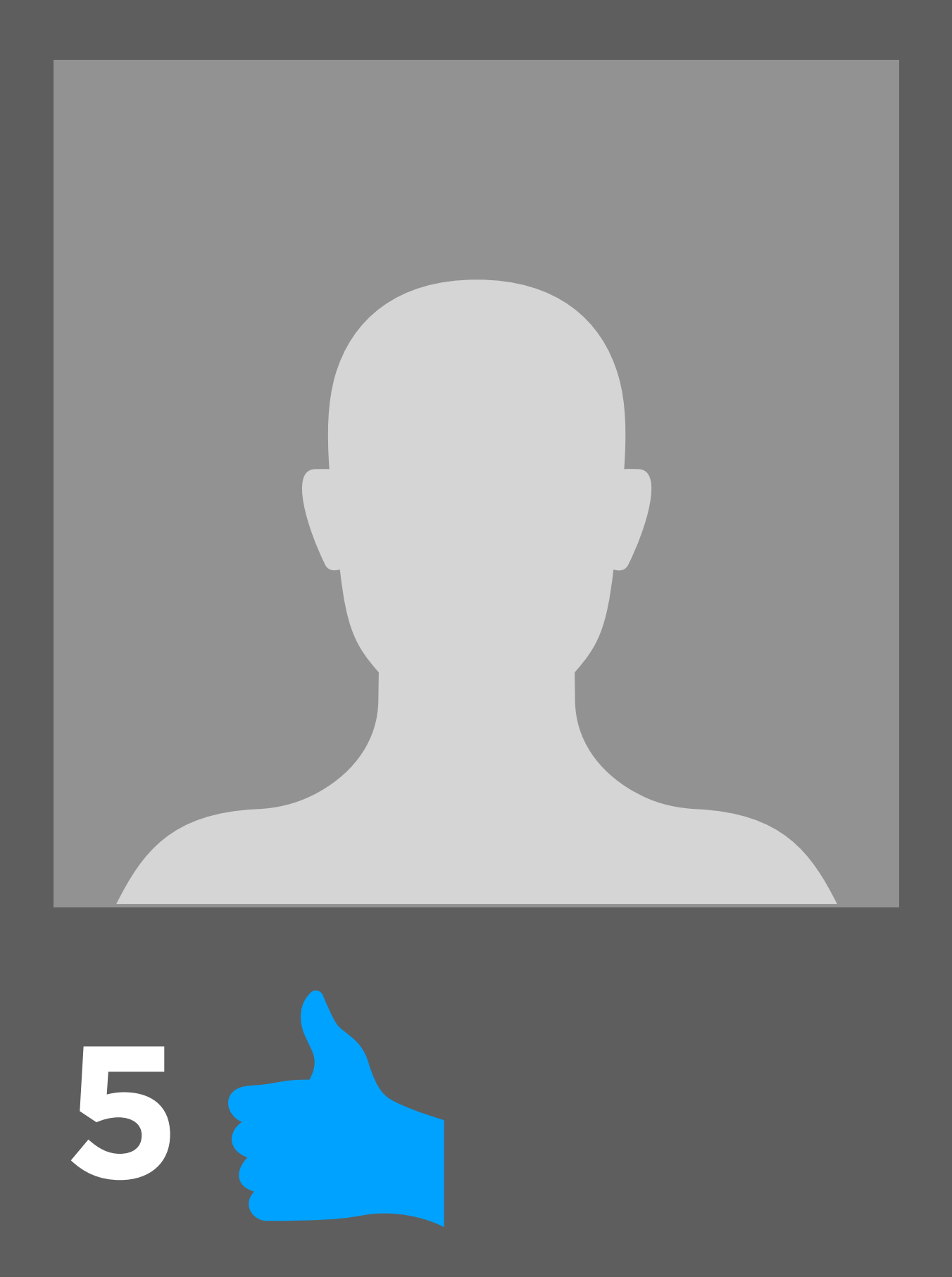
```
from cs50 import SQL
```

# Exercise

Write a program to enroll a student in a course.

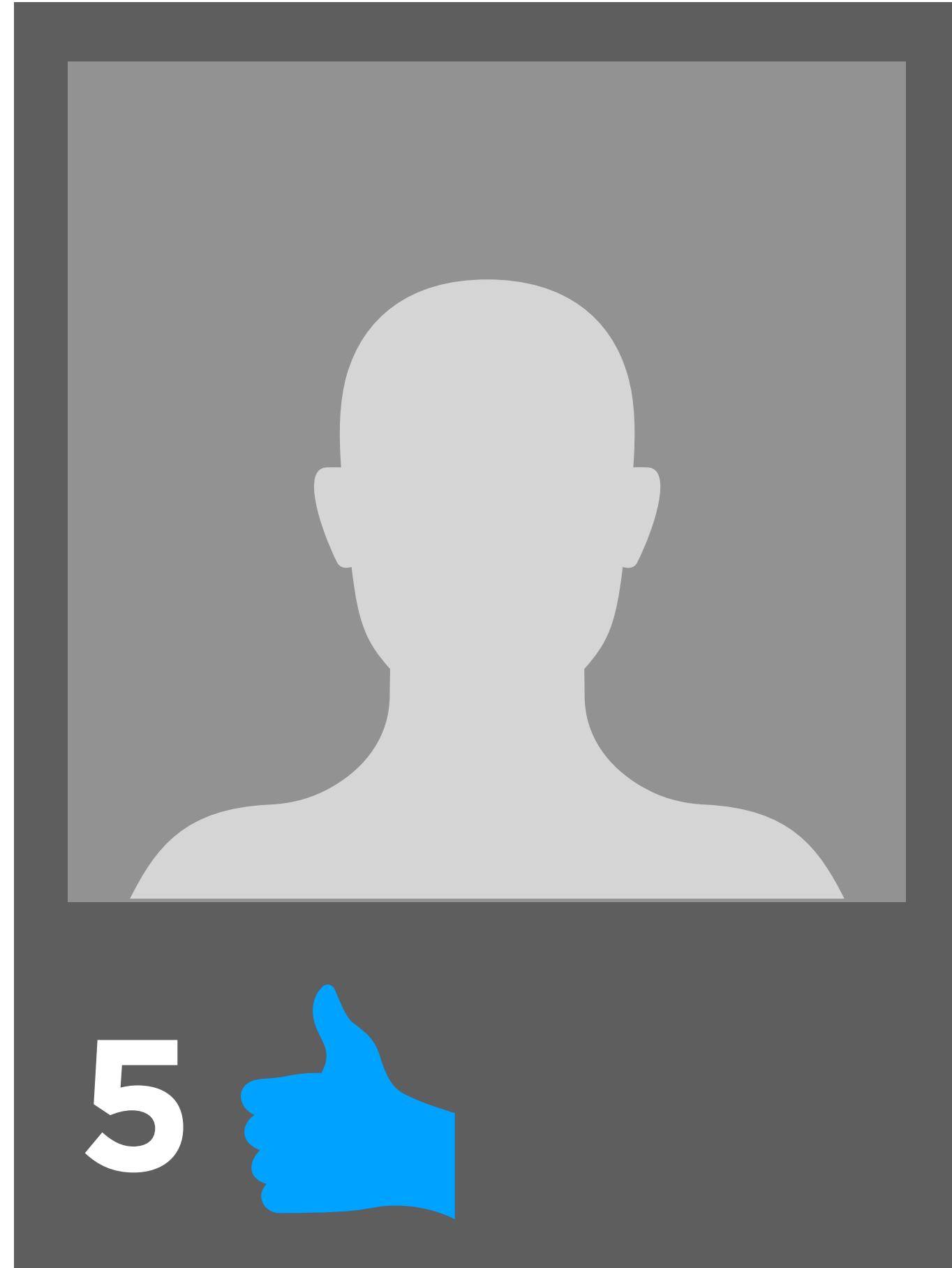


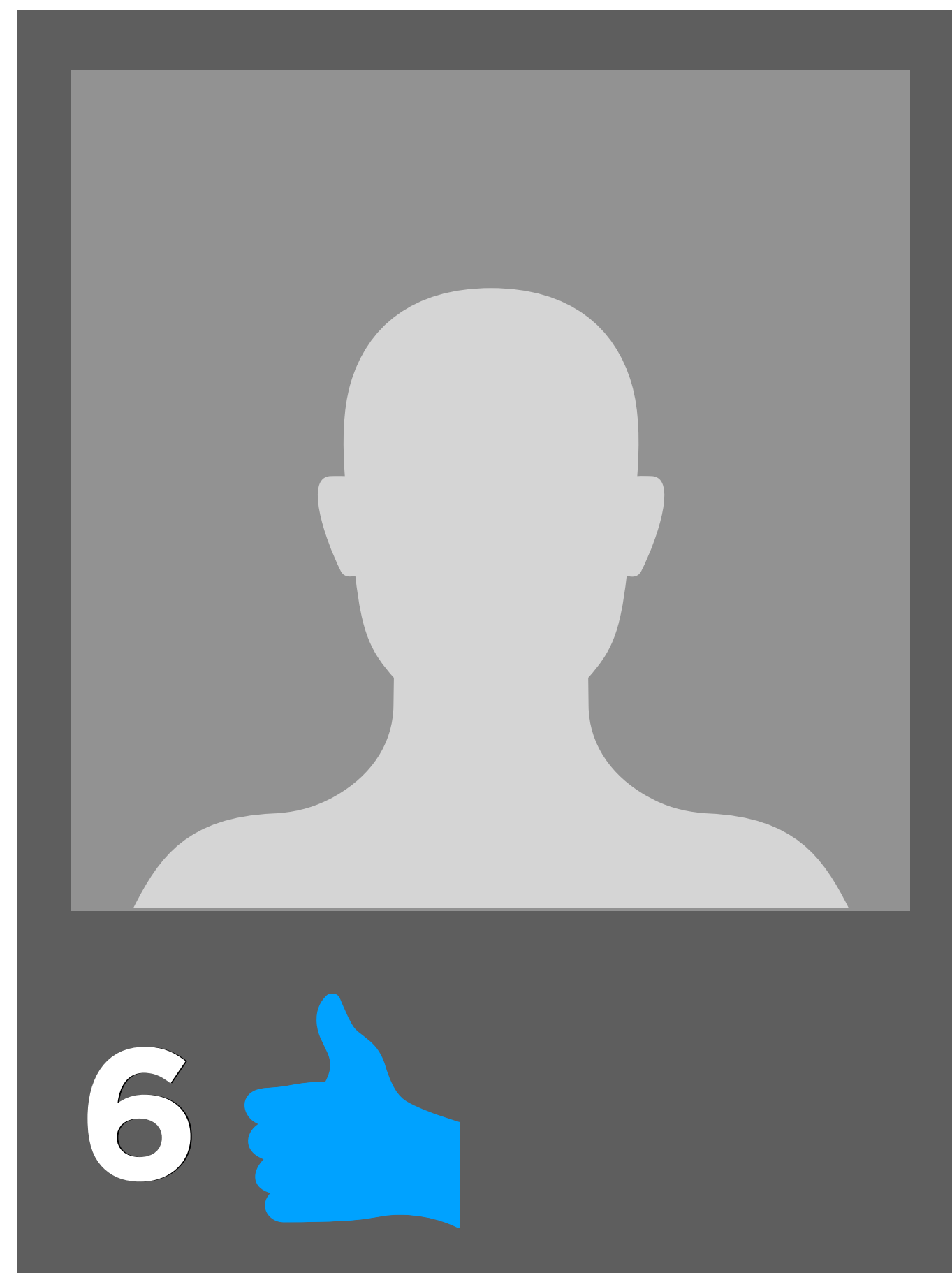
# **Race Conditions**

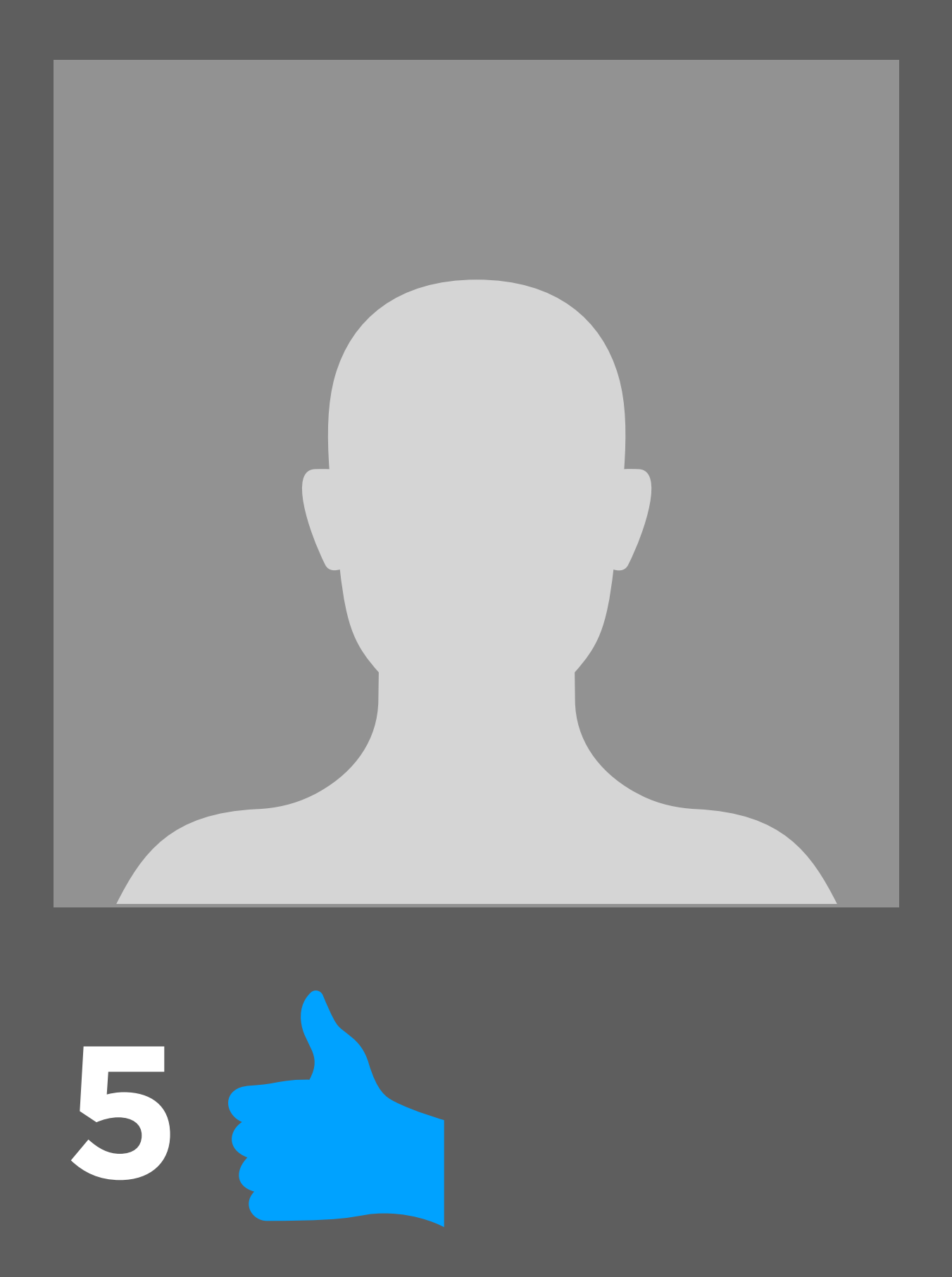








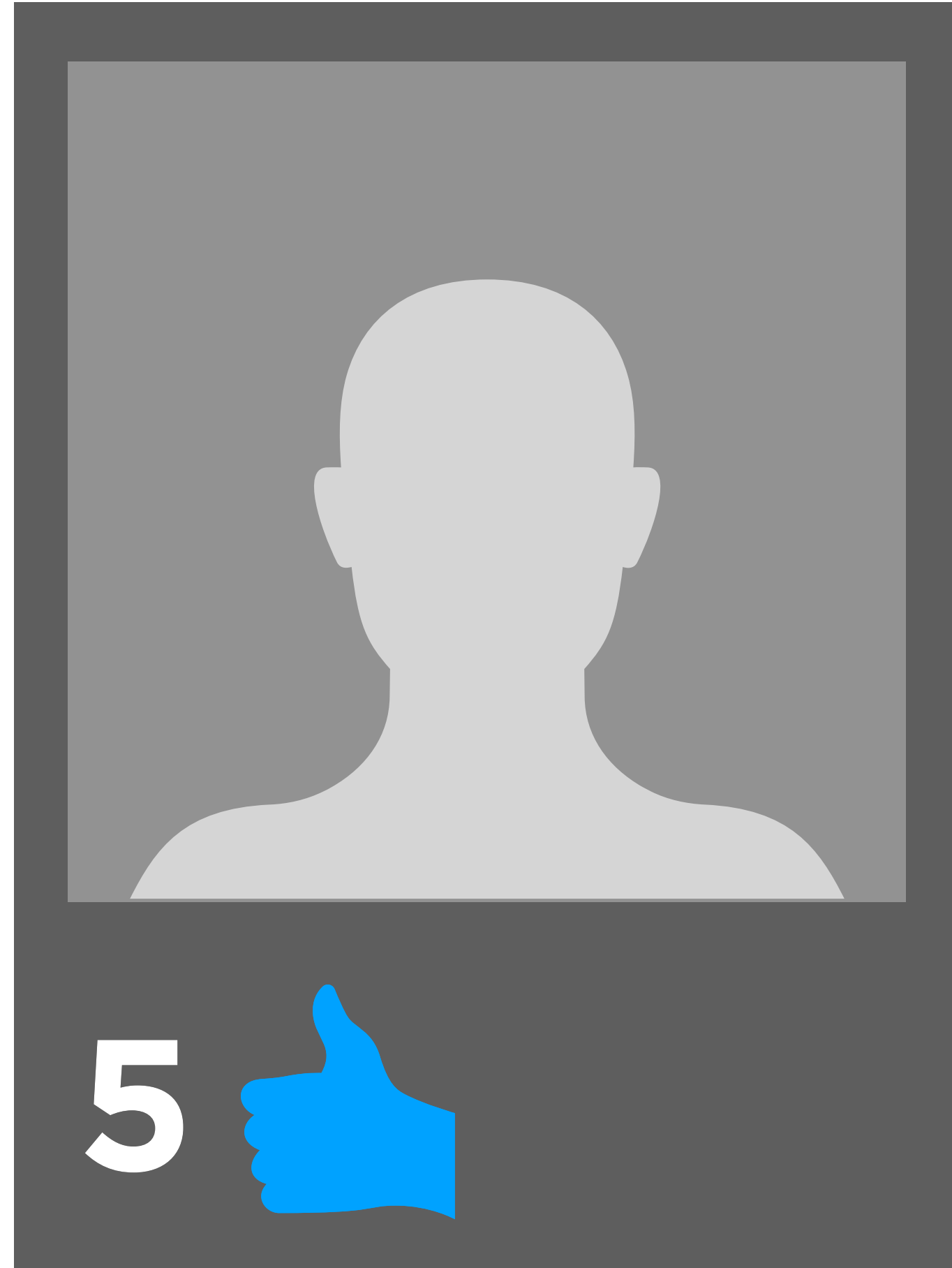


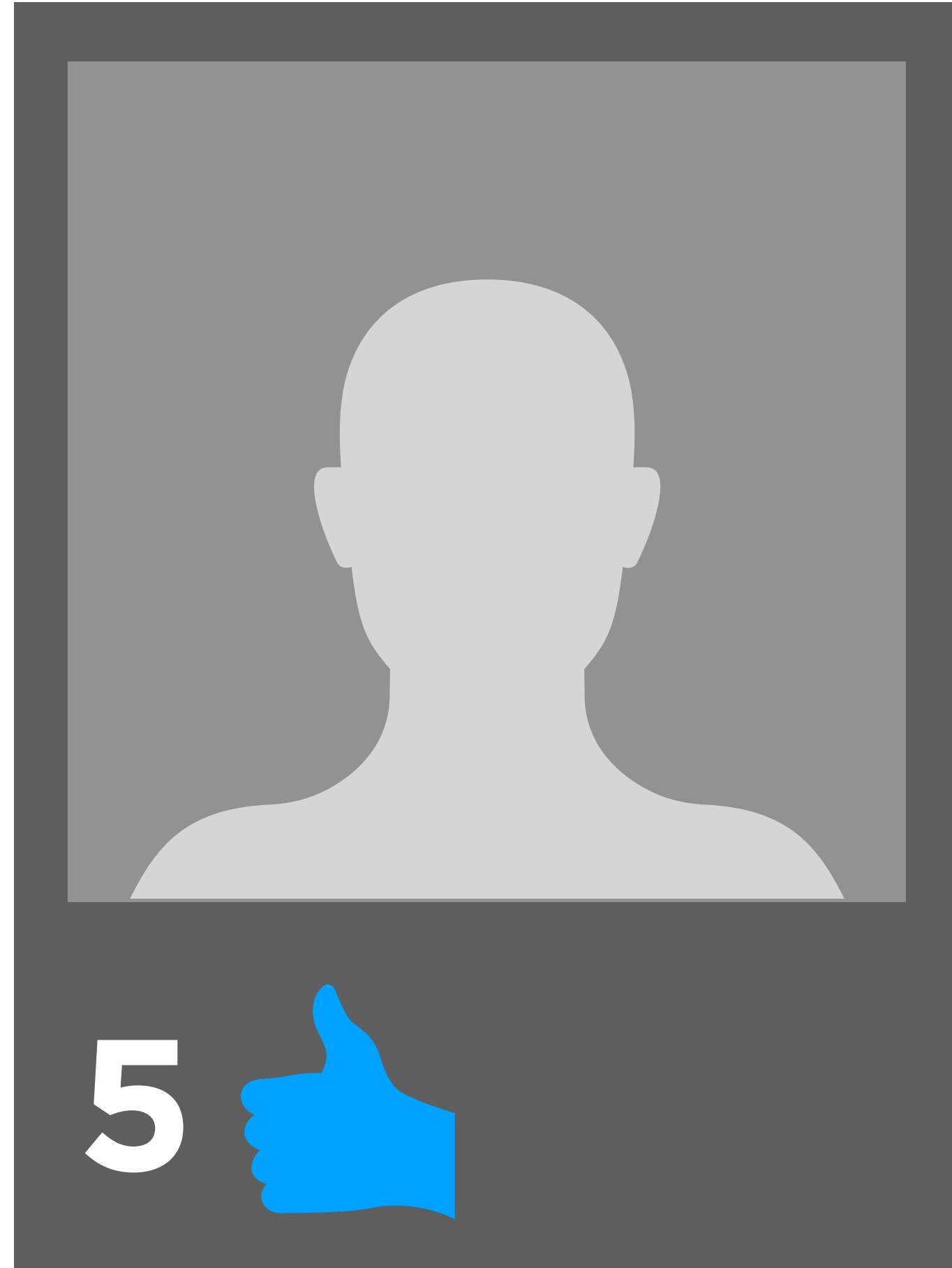


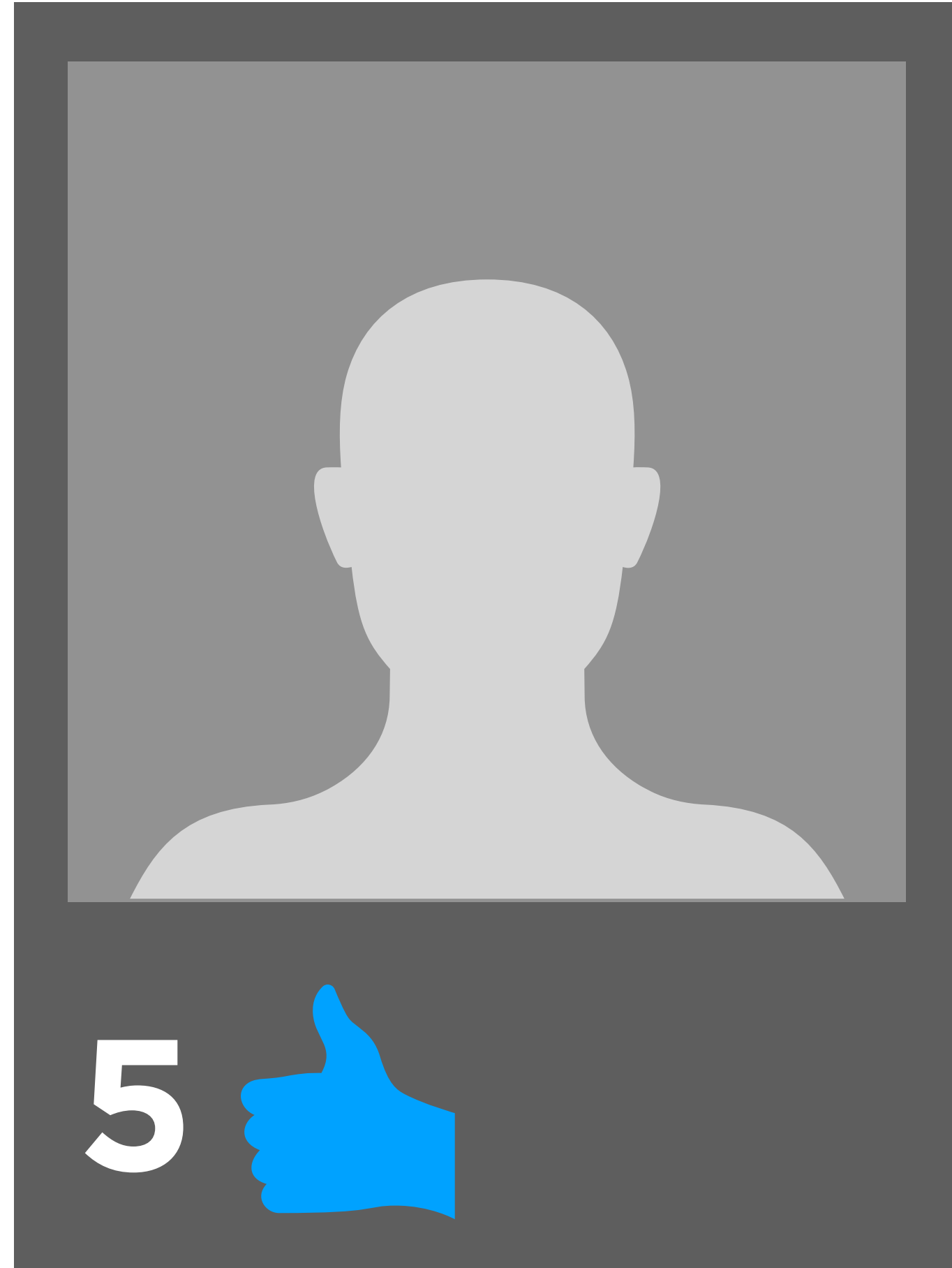




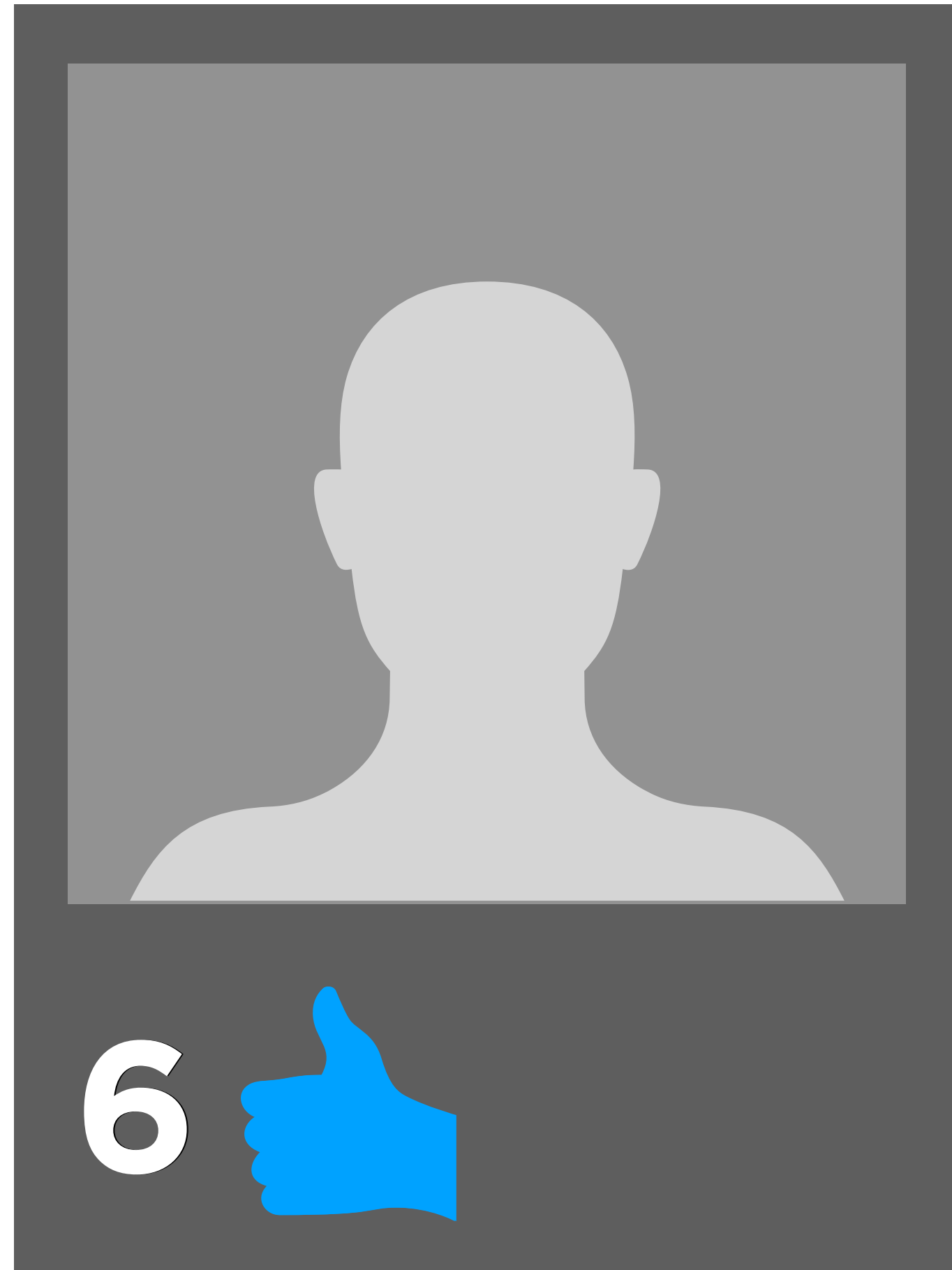














# SQL Injection



**Username:**

**Password:**

```
SELECT * FROM users  
WHERE username = username AND password = password;
```

**Username:**

harry

**Password:**

12345

```
SELECT * FROM users  
WHERE username = username AND password = password;
```

```
SELECT * FROM users  
WHERE username = "harry" AND password = "12345";
```

**Username:**

hacker" --

**Password:**

```
SELECT * FROM users  
WHERE username = username AND password = password;
```

```
SELECT * FROM users  
WHERE username = "hacker" --" AND password = "";
```



```
SELECT * FROM users  
WHERE username = "hacker" --" AND password = "";
```

PART THREE

**Lab**

# Problem Set 7

# Problem Set 7

- Movies
- Fiftyville

**This is CS50.**