**Instructions:** There are 4 sections to this exam. Answer all questions to your best ability. Please organize your code into a folder, labelling each filename appropriately for each question, and send a ZIP file with your results.

## 1. Python Questions

1. Write a python function which returns the maximum of the absolute value of three numbers. Include appropriate error handling.

2. Write a python function to extract data between HTML tags using Regex. Your function should accept an input string and a list of HTML tags to look for. Your function should return a list of the extracted data.

## 2. SQL Questions.

A group of friends want to track details about their cars so they can coordinate road trips together. They created two tables, shown below.

**Cars**

| pk | type | color | maximum_passengers |
|---|---|---|---|
| 0 | SUV | Red | 5 |
| 1 | SUV | Blue | 7 |
| 2 | Sedan | Green | 5 |
| 3 | Minivan | Red | 8 |

**Persons**

| pk | name | age | car |
|---|---|---|---|
| 0 | Randall | 25 | 2 |
| 1 | Miriam | 31 | 1 |
| 2 | Abhinav | 27 | 0 |
| 3 | Zahra | 28 | 3 |

1. Write an SQL Query that returns a query results where each row contains all information for each person and their car.

2. Let's say that now everyone agreed to start sharing cars, but not uniformly. Abhinav will let Miriam and Zahra drive his car. Miriam will only let Abhinav drive her car. Randall won't let anyone drive his car, and Zahra will let everyone drive her car. Show how you would design a table structure to accomplish this. You may choose to do this in Word, Excel, or a similar program and attach it with your submission.

3. Miriam will now also let Randall drive her car. Write an SQL query to update the relevant tables from the previous question.

4. Write an SQL Query that returns a query results, like in question 2.1, where each row contains all information for each person and car based on your new table structure.

## 3. Docker Questions

1. Write a basic Docker container that runs a python script that prints 'Hello World!' to the console before it exits. Submit your code and Dockerfile/docker-compose.yaml.

2. Dockerize your code from question 1.2. You can accept the HTML data as input from the console.

## 4. Algorithm Questions

1. Write an algorithm to process a large quantity of text files. The files are not homogenous in their format, but each one belongs to one of five categories. To process a file, you need to extract some data from it, and post the result to a server. You can have as many programs (copies of this algorithm) operating on this task in parallel to complete it. How would you design this algorithm? Draw a flow diagram and explain your algorithm. **Do note write any code for this question**.

2. Estimate how many panes of glass are in your hometown. Explain your reasoning.