Part A

Question 1.

`vi daily_temperature_1000_cities_1980_2020_transformed.csv`
The file includes temperature data for 1000 cities from 1980 to 2020.

Question 2.

```
x=$(grep Toronto
daily_temperature_1000_cities_1980_2020_transformed.csv | wc -l); if
(($x > 0)); then echo 'Toronto found!'; else echo 'Toronto not
found.'; fi;
```

- `x=$(...)` assigns the output of the command inside `$(...)` to the variable `x`.
- `grep Toronto daily_temperature_1000_cities_1980_2020_transformed.csv` uses the `grep` command to search for lines containing “Toronto” in the file. `Toronto` is the search pattern.
- The `|` passes the output of the `grep` command to the `wc` command. The `-l` flag of the `wc` command counts the number of lines in the input.
- The `if (($x > 0))` command checks whether the value of `x` is greater than 0.
- The `then echo 'Toronto found!'` command prints “Toronto found!” if the previous `if` command is true.
- The `else echo 'Toronto not found.'` command prints “Toronto not found.” if the previous `if` command is false.
- The `fi` command marks the end of the `if` statement.

Question 3.

`grep Canada daily_temperature_1000_cities_1980_2020_transformed.csv`
The above command searches for all lines containing the word “Canada” in the file `daily_temperature_1000_cities_1980_2020_transformed.csv`

Question 4.

`grep Canada daily_temperature_1000_cities_1980_2020_transformed.csv > canada_cities.csv`
The above command searches for all lines containing the word “Canada” in the file `daily_temperature_1000_cities_1980_2020_transformed.csv` and writes those lines to a new file called `canada_cities.csv`.

Question 5.

<no deliverable>

Question 6.

Original file: 387 B
Preprocessed file: 942 KB

Preprocessor directives are instructions for the preprocessor and are not actual program statements. They begin with a # symbol: `#define`, `#include`, `#if`, `#endif`, and `#pragma`.
The `#define` directive will replace all instances of some text with a value. For example, `#define MAX_LENGTH 10` will replace all instances of `MAX_LENGTH` in the code with the value `10`.
The `#include` directive will include the contents of a header file. For example, `#include <iostream>` will include the standard library called `iostream` and `#include customheader.h` will include the non-standard header called `customheader`.

Question 7.

The generated assembly code doesn't make any system calls to the kernel. However, some of the functions (like `_ZNSt14basic_ifstreamIcSt11char_traitsIcEE4openEPKcSt13_Ios_Openmode@PLT`) will eventually make a system call.

This function will call the `openat()` system call under the hood when executed on a Linux system.

Part B

Question 8.

```
Enter a city name: Toronto
Found city: Toronto
Enter a city name:
asdfasdf
City not found. Enter a country: Cuba
Found city: Santiago de Cuba
Enter a city name: Cuba
City not found. Enter a country: Cuba
Found city: Havana
Enter a city name:
```

```
1980-01-01,0.17
1980-01-02,-5.78
1980-01-03,-7.9
1980-01-04,-5.04
1980-01-05,-6.56
1980-01-06,-1.17
1980-01-07,-6.23
1980-01-08,-8.01
1980-01-09,-8.41
1980-01-10,4.72
1980-01-11,-4.7
1980-01-12,-4.08
1980-01-13,2.89
1980-01-14,1.4
1980-01-15,0.61
1980-01-16,3.7
1980-01-17,3.33
1980-01-18,1.58
1980-01-19,-0.46
1980-01-20,-1.91
1980-01-21,-0.24
1980-01-22,-5.0
1980-01-23,-10.32
1980-01-24,-10.0
1980-01-25,-7.16
1980-01-26,-6.07
```

```
1980-01-01,19.23
1980-01-02,19.69
1980-01-03,21.16
1980-01-04,20.09
1980-01-05,17.84
~
```

Question 9.

<no deliverable>

Question 10.

```
boris@laptop-server:~$ ps -u boris
    PID TTY          TIME CMD
   1810 ?        00:00:00 systemd
   1811 ?        00:00:00 (sd-pam)
   1919 ?        00:00:06 sshd
   1920 pts/0    00:00:00 bash
   2272 ?        00:00:00 sshd
   2273 ?        00:00:00 sftp-server
   6094 ?        00:00:00 dbus-daemon
   6378 pts/0    00:00:00 vi
   7965 ?        00:00:00 sshd
   7966 ?        00:00:00 sftp-server
   8282 pts/0    00:00:00 PartB.out
   8283 pts/0    00:00:00 PartB.out
   8286 pts/0    00:00:00 PartB.out
   8289 pts/0    00:00:00 PartB.out
   8365 ?        00:00:00 sshd
   8366 pts/1    00:00:00 bash
   8581 pts/1    00:00:00 ps
```

Question 11.

<no deliverable>