

# COMP10001 Foundations of Computing

## Semester 1, 2022

### Tutorial Questions: Week 9

— VERSION: 1478, DATE: MAY 2, 2022 —

## Discussion

1. What is a “list comprehension”? How do we write one and how do they make our code simpler?

### Now try Exercise 1

2. Why do we use “files”? Could we use computers without them?
3. What are the steps to reading and writing files?
4. What is a “csv” file and why is it useful for storing and manipulating data?

### Now try Exercises 2 & 3

## Exercises

1. Evaluate the following list comprehensions. For each one, also write some python code to generate the same list without using a comprehension.

- (a) `[(name, 0) for name in ("evelyn", "alex", "sam")]`
- (b) `[i**2 for i in range(5) if i % 2 == 1]`
- (c) `"".join([letter.upper() for letter in "python"])`

2. Fill in the blanks in the program below which reads from `in.txt` and writes to `out.txt`.

```
outfile =  ("out.txt", "w")
with open("in.txt", ) as infile:
    line_no = 1
    for line in :
        outfile. (f"line:_{line_no},_length:_{len(line)}\n")
        line_no += 1
outfile.write("The_End")

```

3. “travel.csv” is a csv file containing data on how people get to work in different cities in Australia. “process.py” is a python program which processes this data. What information does the “process.py” attempt to find and print? How could we edit it to find different statistics?

travel.csv

```
City,Train,Tram,Bus,Ferry,Car>Total
Melbourne,242969,55169,31937,783,1282997,1613855
Sydney,368572,3210,138340,9007,1206350,1725482
Adelaide,13715,4137,33673,211,390360,442102
Brisbane,62069,229,58228,3761,663353,787650
Perth,56417,223,37899,373,594571,689489
```

Data Source: Census of Population and Housing, 2016, TableBuilder

process.py

```
import csv

fp = open("travel.csv")
city = ''
curr_max = 0.0
for row in csv.DictReader(fp):
    ferry = int(row["Ferry"])
    total = int(row["Total"])
    if ferry / total > curr_max:
        city = row["City"]
        curr_max = ferry / total
print(city)
```

## Problems

1. Let's head back to worksheet 8 and solve "For a While ..." again! **Using a list comprehension**, rewrite the function `allnum` that takes a list of strings, and returns a list of those that exclusively contain digits. `allnum(['3', '-4', '5', '3.1416', '0xffff', 'blerg!'])` should return `['3', '5']`.
2. Write a function which takes a filename as a string and opens the file, printing statistics for every line in the file: the line number, number of words, number of characters. Remember to close the file when you're done!