6.4 Functions and file processing

Name: _____ Class: _____ Date: _____ **Total: 22 marks**

KEY WORDS function • parameter • return • local variable • global variable • mode

Objective

Build the skills to answer exam questions on **functions and file processing** – parameters, return values, local and global scope, and reading and writing text files.

You must be able to:

- write a **function** with **parameters** that **returns** a value
- tell a **local variable** from a **global variable**
- choose the file **mode** `"r"`, `"w"` or `"a"`, and say what each does to an existing file
- read a file line by line, split each line into fields and process them

1 Key knowledge and worked examples

Study these first. Each one shows the method for a question type used later.

■ Key knowledge: functions and scope

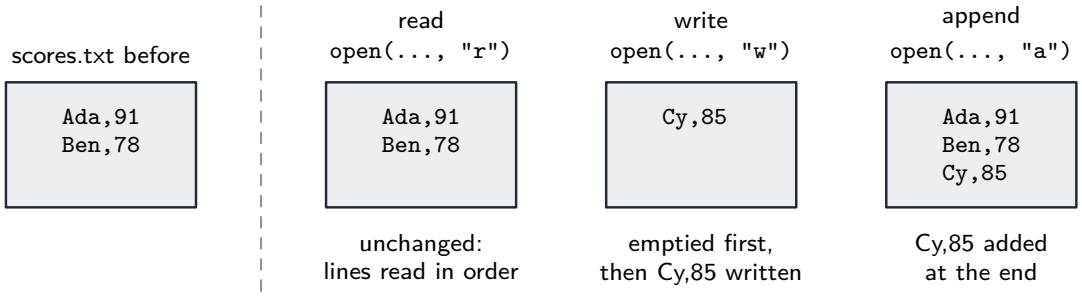
```
RATE = 0.1                      # global constant

def discount(price, qty):
    total = price * qty         # local: exists only during the call
    if qty >= 10:
        total = total - total * RATE
    return total

print(discount(4.0, 12))        # 43.2
```

- `price` and `qty` are parameters; `4.0` and `12` are the **arguments** passed in.
- `return` sends the result back to the caller; a function with no `return` gives `None`.
- `total` cannot be used outside `discount`: it is local. Splitting a program into functions is **modularity** .

Key knowledge: file modes



- `with open(name, mode) as f:` closes the file when the block ends, even after an exception.
- Reading a missing file raises `FileNotFoundError`.

Worked example: processing a file

`scores.txt` holds one `name,score` per line. Print the names with a score of at least 80, and the mean score.

```
count, total = 0, 0
with open("scores.txt", "r") as f:
    for line in f:
        name, score = line.strip().split(",")
        score = int(score)
        count = count + 1
        total = total + score
        if score >= 80:
            print(name)
print(total / count)
```

1. `for line in f` reads one line at a time, `"Ada,91\n"`.
2. `strip()` removes the `"\n"`; `split(",")` gives `["Ada", "91"]`.
3. `int(score)` casts the text to a number before comparing or adding.
4. For `Ada,91` and `Ben,78`: prints `Ada`, then $(91 + 78)/2 = \mathbf{84.5}$.

2 Practice

2.1 Write a function `area(w, h)` that returns the area of a rectangle, and a statement that prints the area of a 3 by 5 rectangle. [2]

2.2 In the `discount` code above, name (i) a parameter; (ii) a local variable; (iii) a global constant. [3]

2.3 State the mode to use for each, and why: (i) adding today's temperature to a log kept all year; (ii) loading saved settings; (iii) replacing last week's report with a new one. [3]

2.4 `line = "Lee,17,B\n"`. State the value of `line.strip().split(",")`. [1]

3 Exam-style questions

3.1 What does `open("data.txt", "w")` do to an existing `data.txt`? [1]

- **A** adds new lines to the end
- **B** empties it before writing
- **C** reads it from the start
- **D** raises an error

3.2 `def f(x): y = x * 2`. What does `print(f(3))` print? [1]

- **A** `6`
- **B** `3`
- **C** `None`
- **D** an error, as `y` is undefined

3.3 Which is the main advantage of using functions? [1]

- **A** the program uses no variables
- **B** each part can be written, tested and reused separately
- **C** the program runs without errors
- **D** files are closed automatically

3.4 A club stores its members in `members.txt`, one line each, as `name,year joined`, for example `Mei,2019`.

(a) Write a function `joined_before(filename, year)` that returns how many members joined before `year`. [5]

(b) The file holds `Mei,2019`, `Tom,2023` and `Raj,2015`. State the value of `joined_before("members.txt", 2020)`. [1]

(c) Write a statement that adds the new member `Zoe,2026` to the file without losing the others. [2]

(d) Explain what happens if the file does not exist, and how the program could deal with it. [2]