

# SAMPLE LAB EXAM (Deadline Friday 11 February 23:59)

## Before starting

- The exam runs 1400-1550.
- Upload all code to [Einstein](#).
- All [lab exam rules](#) apply.
- To pass all tests submit from L101, L114, L125 or L128.

## Question 1 [25 marks]

- You have some water and some buckets to fill.
- Write a program called `water_051.py` that reads two lines of text from `stdin`.
- Line 1 contains a single integer, N, the number of litres of water available. N is in the range 0-1000.
- Line 2 lists the capacity in litres of one or more buckets. The capacity of each bucket is specified by a positive integer.
- Buckets must be filled in the order specified on line 2.
- Your program should output the number of buckets that can be completely filled before you run out of water.
- In this example we have 10 litres of water. We fill the first bucket (taking 6 litres), we fill the second bucket (taking another 2 litres) but we run out of water before we have completely filled the third bucket (it requires 5 litres). We output 2 (the number of buckets completely filled):

```
$ cat water_stdin_00_051.txt
10
6 2 5 1 1
```

```
$ python3 water_051.py < water_stdin_00_051.txt
2
```

## Question 2 [25 marks]

- A hotel needs your help.
- Write a program called `hotel_051.py` that reads a single line of numbers from `stdin`.
- The first number in each line is, N, the number of rooms in the hotel. Rooms are numbered 1 to N. N is in the range 1-1000.
- Following N is a list of the rooms that are occupied. Occupied room numbers are listed in random order and in the range 1-N. Each occupied room number appears no more than once in the list. It is possible that no rooms are occupied.
- Write a program that reads the above input and outputs the lowest numbered available room or `no room` if none are available.

- In this example there are 5 rooms in the hotel, rooms 4, 2, 1 are occupied. So the lowest numbered available room is 3:

```
$ cat hotel_stdin_00_051.txt
5 4 2 1
```

```
$ python3 hotel_051.py < hotel_stdin_00_051.txt
3
```

- In this example, there are 8 rooms in the hotel and all are occupied so the output is no room:

```
$ cat hotel_stdin_01_051.txt
8 7 1 3 4 6 8 5 2
```

```
$ python3 hotel_051.py < hotel_stdin_01_051.txt
no room
```

### Question 3 [25 marks]

- A *pangram* is a phrase that includes at least one occurrence of each of the 26 letters, a-z.
- Write a program called `pangram_051.py` that reads lines of text from `stdin`.
- For each line of text read the program should print `pangram` if that line is a pangram.
- If a line of text is not a pangram the program should print which letters are missing (i.e. those required to make it a pangram). These should be printed in lower case and in increasing alphabetical order.
- A letter occurs in the line of text if it occurs in either upper or lower case.
- You can assume each line contains 1-100 characters.
- For example:

```
$ cat pangram_stdin_00_051.txt
The quick brown fox jumps over the lazy dog.
ThE QUICK brown fox jumps oVer the lazy dog.
ZYXW, vu TSR Ponm lkj ihgfd CBA.
.,?!'" 92384 abcde FGHIJ
```

```
$ python3 pangram_051.py < pangram_stdin_00_051.txt
pangram
pangram
missing eq
missing klmnopqrstuvwxyz
```

### Question 4 [25 marks]

- Write a program called `golf_051.py` that reads an arbitrary number of golf scores from `stdin`.
- Each line consists of a player's name followed by the number of shots taken by that player on each of three golf holes and is structured as follows:

*Player\_name shots\_hole\_1 shots\_hole\_2 shots\_hole\_3*

- Having read in all lines the program should print the results in ascending order of total shots taken by each player.
- Any player who records an invalid score on any hole is disqualified and omitted from the results table.
- A valid score for each hole is a positive integer.
- If any players have been disqualified their comma-separated names should be printed following the results (in the order encountered when read from `stdin`).
- You can assume the following:
  - There will be no ties.
  - Exactly three scores are entered per player but scores may be invalid.

- For example:

```
$ cat golf_stdin_00_051.txt
Leona Maguire 4 4 4
Tiger 6 7 5
Harold Varner III 2 3 4
Ernie Els 6 6 5
Stephanie Meadow 2 2 3
Sam Burns 7 9 8
```

```
$ python3 golf_051.py < golf_stdin_00_051.txt
Stephanie Meadow: 7
Harold Varner III: 9
Leona Maguire: 12
Ernie Els: 17
Tiger: 18
Sam Burns: 24
```

- For example:

```
$ cat golf_stdin_01_051.txt
Leona Maguire 4 4 4
Tiger 6 7 5
Harold Varner III 2 X 4
Ernie Els 6 6 5
Stephanie Meadow 2 2 3
Sam Burns 7 9 8
```

```
$ python3 golf_051.py < golf_stdin_01_051.txt
Stephanie Meadow: 7
Leona Maguire: 12
Ernie Els: 17
Tiger: 18
Sam Burns: 24
Disqualified: Harold Varner III
```

- For example:

```
$ cat golf_stdin_02_051.txt
Leona Maguire 4 4 4
Tiger 6 7 5
Harold Varner III 2 X 4
Ernie Els 6 6 5
Stephanie Meadow Z 2 3
Sam Burns 7 9 8
```

```
$ python3 golf_051.py < golf_stdin_02_051.txt
Leona Maguire: 12
Ernie Els: 17
Tiger: 18
Sam Burns: 24
Disqualified: Harold Varner III, Stephanie Meadow
```