

Name: Tom Owen

Student Number: 2520277

WORKSHEET 3 – TESTING (Lap Times)

1. Original code:

[Copy and paste your original code from Moodle into this box. Do not change it.]

```
laps = []
target = []

for counter in range(0, 5, 1):
    driverLaps = float(input("Enter a lap time: "))
    laps.append(driverLaps)

total = sum(laps)
print("Your overall time: ",(total))

total = sum(laps)
average = total / len(laps)
print("Your average was: ",(average))

minNumber = min(laps)
print("Your fastest lap: ",(minNumber))

maxNumber = max(laps)
print("Your slowest lap: ",(maxNumber))

driverTarget = float(input("Enter a target lap time: "))
for counter in range(0, 5, 1):
    if laps[counter] < driverTarget:
        print("Lap", counter, "was faster than the target time")

print ("Lap 1 was", laps[0])
print ("Lap 2 was", laps[1])
print ("Lap 3 was", laps[2])
print ("Lap 4 was", laps[3])
print ("Lap 5 was", laps[4])
```

2. Code Testing

For each test below, run your code and show the results of the scenarios below. Present a screenshot of what happened when the programme ran. Did the programme behave correctly or did it do something unexpected, and if so, why?

a) Test a lap time for your programme:

- i) 42 seconds
- ii) 2 seconds
- iii) -4 seconds
- iv) 53444 seconds
- v) Test the target lap time – show that the values entered are reasonable

b) Using the same five lap times as the sample output ie

Lap 1: 42.3
Lap 2: 42.1
Lap 3: 44
Lap 4: 44
Lap 5: 39.4

Examine each statistic (1-6) and comment on whether the correct answer(s) are displayed or not. (If any statistics were incomplete after Phase 1 (code completed in class) simply write "Unfinished")

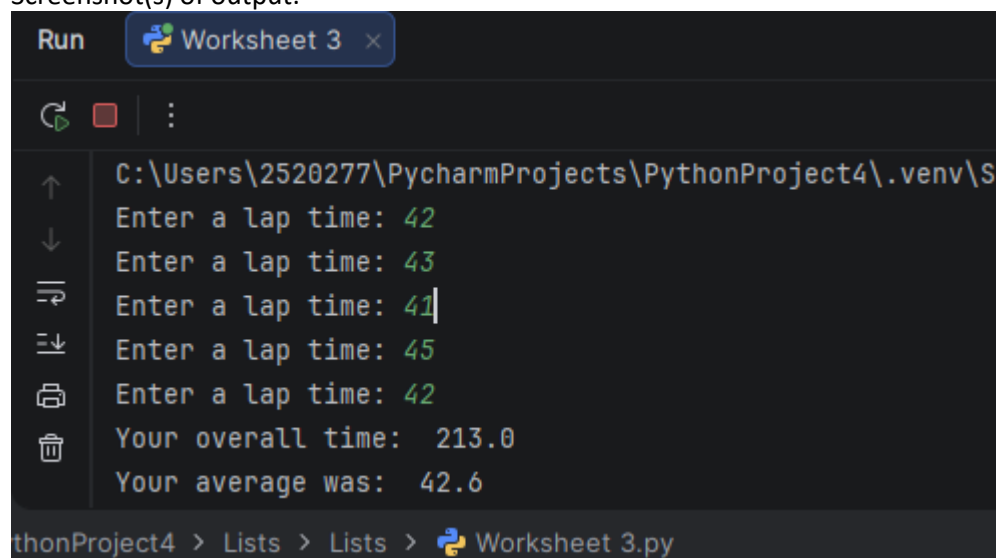
c) Test two further sets of lap times of your own choice.

Template for tests:

Test:

Lap time entered: 42 seconds

Screenshot(s) of output:



```
Run Worksheet 3 x
Enter a lap time: 42
Enter a lap time: 43
Enter a lap time: 41
Enter a lap time: 45
Enter a lap time: 42
Your overall time: 213.0
Your average was: 42.6
thonProject4 > Lists > Lists > Worksheet 3.py
```

Result: Did the programme behave as expected ie syntactically and logically correct?

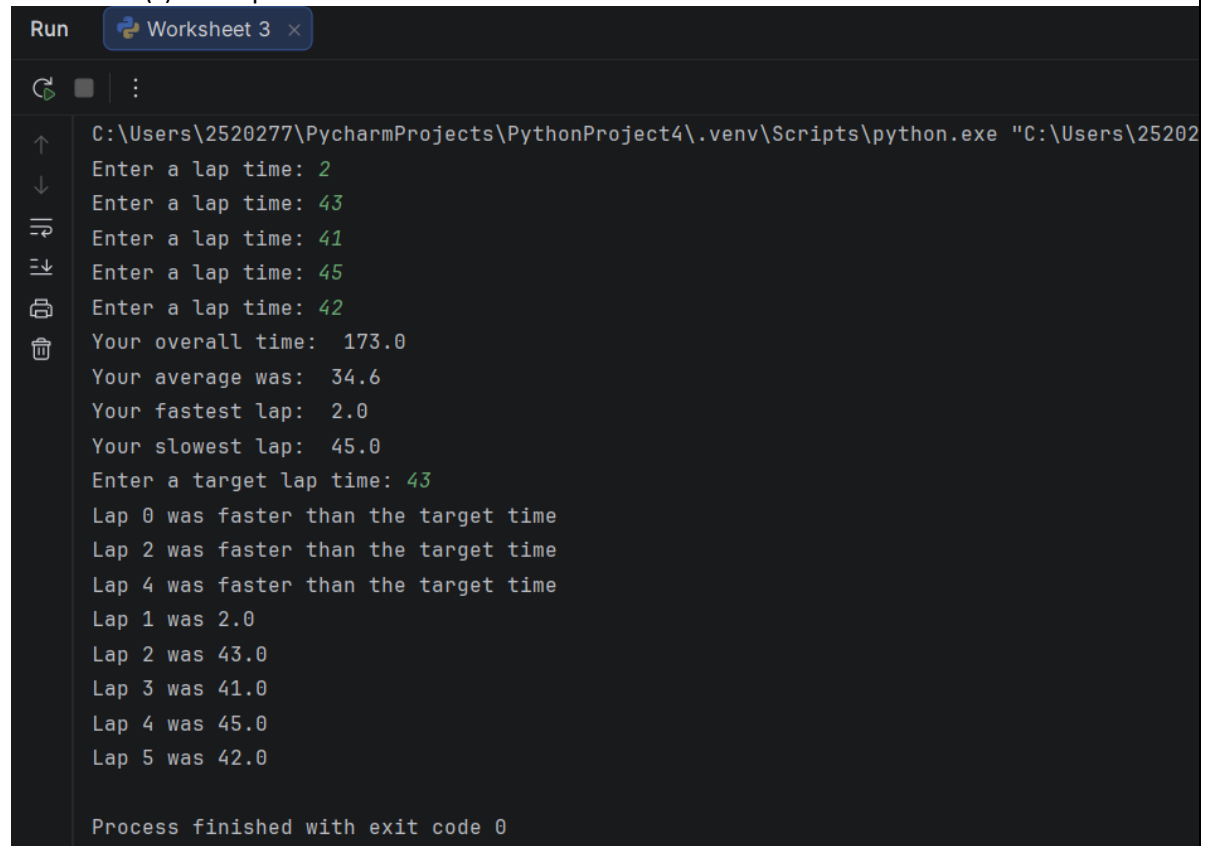
YES

The program accepted 42 seconds as a lap time and continued running. This behaved as expected because 42 seconds is a reasonable positive lap time. The program also calculated the total and average lap time. Some later statistics are incomplete because this is still the original Version 1 code.

Test:

Lap time entered: 2 seconds

Screenshot(s) of output:



```
Run Worksheet 3 x
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Scripts\python.exe "C:\Users\25202
Enter a lap time: 2
Enter a lap time: 43
Enter a lap time: 41
Enter a lap time: 45
Enter a lap time: 42
Your overall time: 173.0
Your average was: 34.6
Your fastest lap: 2.0
Your slowest lap: 45.0
Enter a target lap time: 43
Lap 0 was faster than the target time
Lap 2 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was 2.0
Lap 2 was 43.0
Lap 3 was 41.0
Lap 4 was 45.0
Lap 5 was 42.0
Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

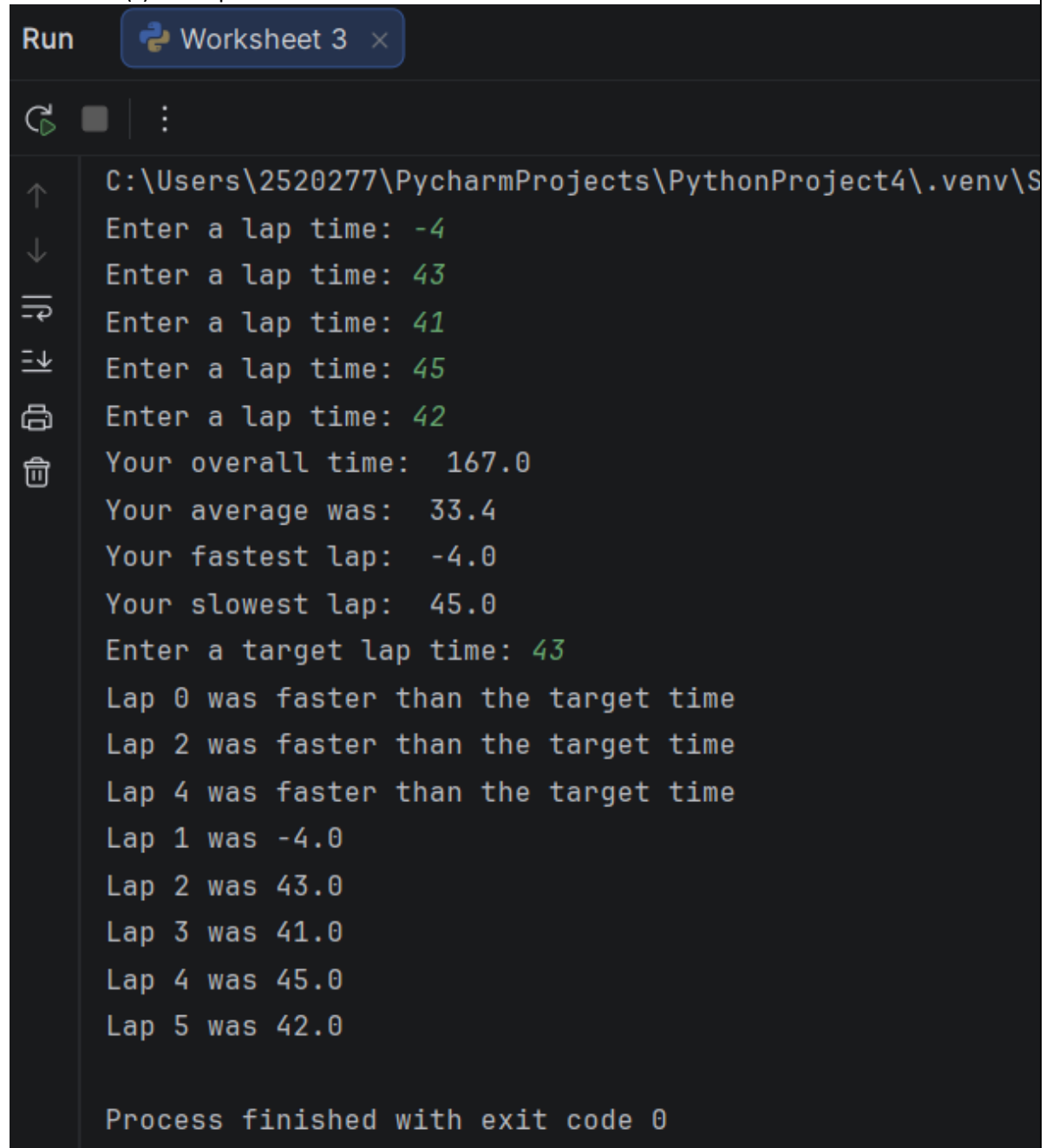
NO

The program accepted 2 seconds as a lap time and continued running. This is syntactically correct because the program did not crash, but it is not logically correct because 2 seconds is not a realistic lap time. The program has no validation, so it accepts unreasonable values and includes them in the total, average, fastest lap and target lap calculations. This could be improved by adding validation to reject lap times that are too low or unrealistic.

Test:

Lap time entered: -4 seconds

Screenshot(s) of output:



```
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Scripts>python
Enter a lap time: -4
Enter a lap time: 43
Enter a lap time: 41
Enter a lap time: 45
Enter a lap time: 42
Your overall time: 167.0
Your average was: 33.4
Your fastest lap: -4.0
Your slowest lap: 45.0
Enter a target lap time: 43
Lap 0 was faster than the target time
Lap 2 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was -4.0
Lap 2 was 43.0
Lap 3 was 41.0
Lap 4 was 45.0
Lap 5 was 42.0

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

NO

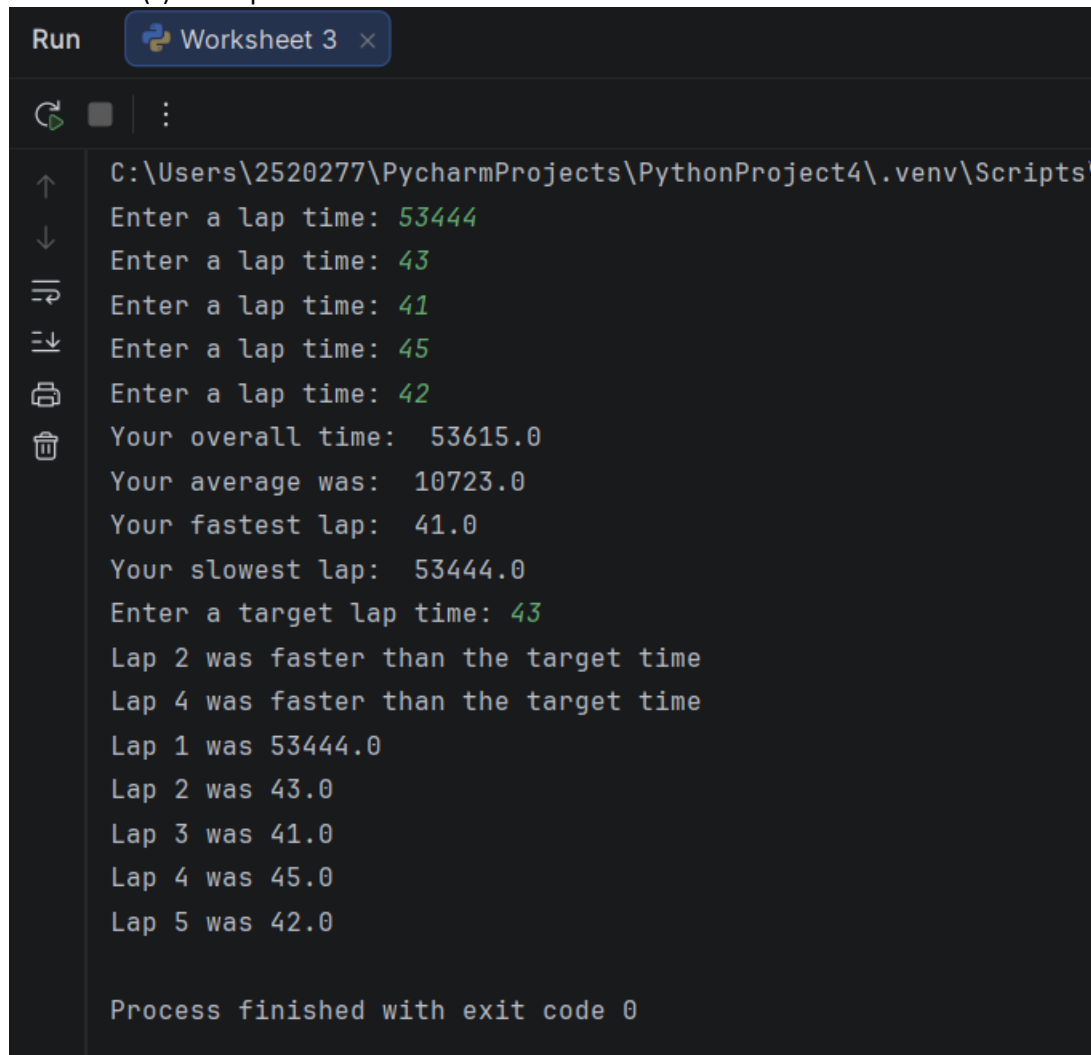
The program accepted -4 seconds as a lap time and continued running. This is not logically correct because a lap time cannot be negative. The program included -4 in the total, average, and fastest lap calculation, which made the results unrealistic. This happened because the original code has no validation to prevent negative numbers. This could be improved by adding validation so the user must enter a positive lap time.

Additionally, the program displayed -4.0 as the fastest lap, which is incorrect in real life terms, because a negative lap time should not be accepted.

Test:

Lap time entered: 53444 seconds

Screenshot(s) of output:



```
Run Worksheet 3 x
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Scripts\python.exe
Enter a lap time: 53444
Enter a lap time: 43
Enter a lap time: 41
Enter a lap time: 45
Enter a lap time: 42
Your overall time: 53615.0
Your average was: 10723.0
Your fastest lap: 41.0
Your slowest lap: 53444.0
Enter a target lap time: 43
Lap 2 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was 53444.0
Lap 2 was 43.0
Lap 3 was 41.0
Lap 4 was 45.0
Lap 5 was 42.0

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

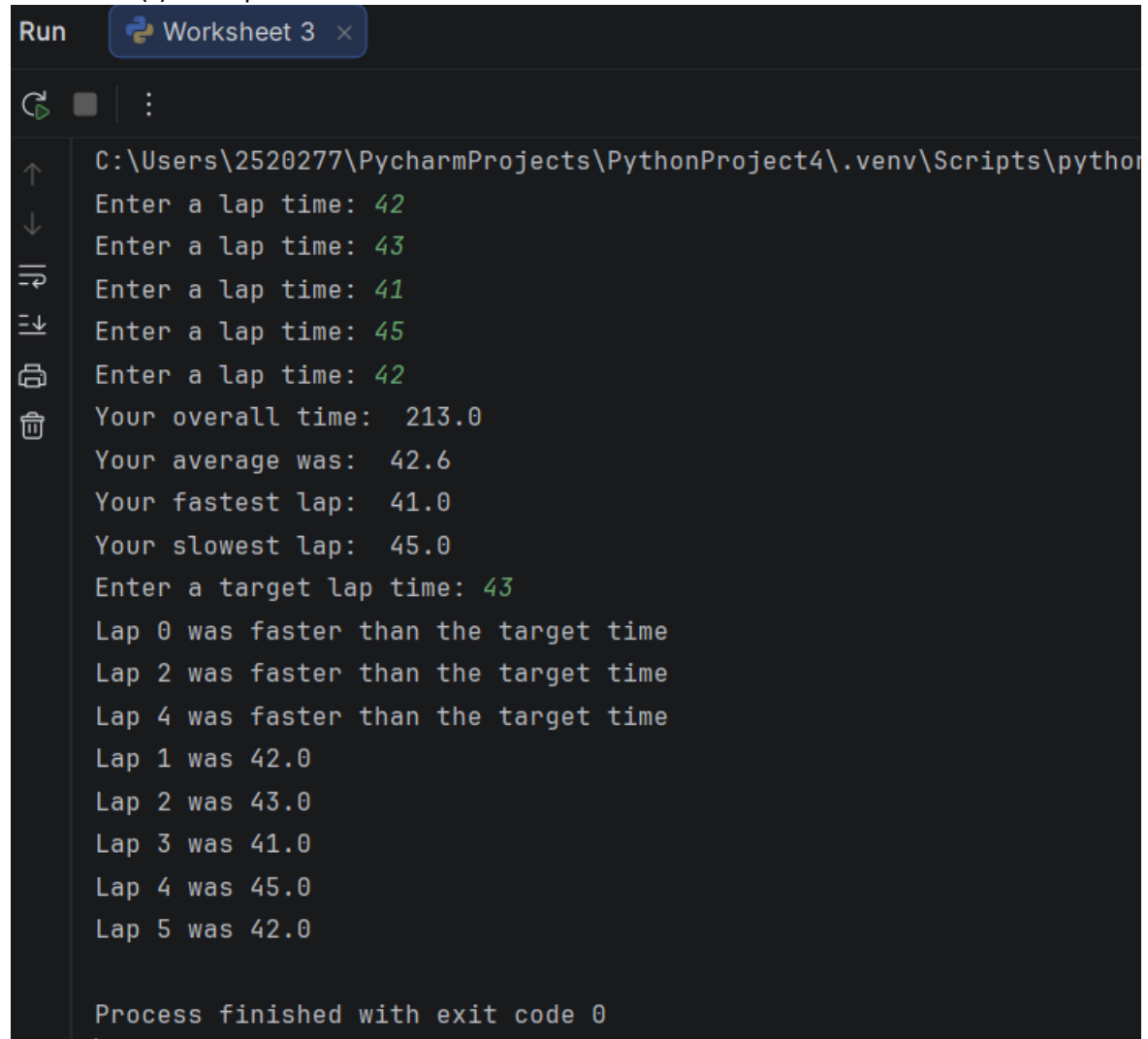
NO

The program accepted 53444 seconds as a lap time and continued running. This is not logically correct because 53444 seconds is an unrealistic lap time. The program included it in the total, average, and slowest lap calculation, which made the results unrealistic. This happened because the original code has no validation to prevent extremely high or unreasonable values. This could be improved by adding validation so the user must enter a realistic lap time.

Test:

Target lap time entered: 43 seconds.

Screenshot(s) of output:



The screenshot shows a PyCharm Run window titled 'Worksheet 3'. The output is as follows:

```
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Scripts\python
Enter a lap time: 42
Enter a lap time: 43
Enter a lap time: 41
Enter a lap time: 45
Enter a lap time: 42
Your overall time: 213.0
Your average was: 42.6
Your fastest lap: 41.0
Your slowest lap: 45.0
Enter a target lap time: 43
Lap 0 was faster than the target time
Lap 2 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was 42.0
Lap 2 was 43.0
Lap 3 was 41.0
Lap 4 was 45.0
Lap 5 was 42.0

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

PARTLY

The program accepted 43 seconds as the target lap time and compared the lap times against it. This was a reasonable target because it was close to the lap times entered. However, the original code is not fully complete because it only displays laps faster than the target using `<`, rather than counting laps equal to or faster than the target using `<=`. This means a lap exactly equal to 43 seconds is not counted as meeting the target.

Test:

Test B Sample lap times.

Screenshot(s) of output:

```
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Script
Enter a lap time: 42.3
Enter a lap time: 42.1
Enter a lap time: 44
Enter a lap time: 44
Enter a lap time: 39.4
Your overall time: 211.8
Your average was: 42.36
Your fastest lap: 39.4
Your slowest lap: 44.0
Enter a target lap time: 42.5
Lap 0 was faster than the target time
Lap 1 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was 42.3
Lap 2 was 42.1
Lap 3 was 44.0
Lap 4 was 44.0
Lap 5 was 39.4

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

YES

The program correctly calculated the overall time for the five laps by adding all five lap times together. The expected total was 211.8 seconds, and the program displayed 211.8 seconds.

Test:

Average lap time

Screenshot(s) of output:

```
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Script
Enter a lap time: 42.3
Enter a lap time: 42.1
Enter a lap time: 44
Enter a lap time: 44
Enter a lap time: 39.4
Your overall time: 211.8
Your average was: 42.36
Your fastest lap: 39.4
Your slowest lap: 44.0
Enter a target lap time: 42.5
Lap 0 was faster than the target time
Lap 1 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was 42.3
Lap 2 was 42.1
Lap 3 was 44.0
Lap 4 was 44.0
Lap 5 was 39.4

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

YES

The program correctly calculated the average lap time by dividing the overall time by 5. The expected average was 42.36 seconds, and the program displayed 42.36 seconds.

Test:

Fastest lap and fastest lap time

Screenshot(s) of output:

```
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Script
Enter a lap time: 42.3
Enter a lap time: 42.1
Enter a lap time: 44
Enter a lap time: 44
Enter a lap time: 39.4
Your overall time: 211.8
Your average was: 42.36
Your fastest lap: 39.4
Your slowest lap: 44.0
Enter a target lap time: 42.5
Lap 0 was faster than the target time
Lap 1 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was 42.3
Lap 2 was 42.1
Lap 3 was 44.0
Lap 4 was 44.0
Lap 5 was 39.4

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

PARTLY

The program correctly displayed the fastest lap time as 39.4 seconds. However, it did not show which lap number was the fastest. The expected answer should show that Lap 5 was the fastest lap. This statistic is only partly complete in the original code.

Test:
Slowest lap and slowest lap time

Screenshot(s) of output:

```
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Script
Enter a lap time: 42.3
Enter a lap time: 42.1
Enter a lap time: 44
Enter a lap time: 44
Enter a lap time: 39.4
Your overall time: 211.8
Your average was: 42.36
Your fastest lap: 39.4
Your slowest lap: 44.0
Enter a target lap time: 42.5
Lap 0 was faster than the target time
Lap 1 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was 42.3
Lap 2 was 42.1
Lap 3 was 44.0
Lap 4 was 44.0
Lap 5 was 39.4

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

PARTLY

The program correctly displayed the slowest lap time as 44.0 seconds. However, it did not show which lap number was the slowest. In this test, Lap 3 and Lap 4 were both the slowest laps, so the program should ideally identify both. This statistic is partly complete in the original code.

Test:

How many laps were equal to or faster than the target lap time

Screenshot(s) of output:

```
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Script
Enter a lap time: 42.3
Enter a lap time: 42.1
Enter a lap time: 44
Enter a lap time: 44
Enter a lap time: 39.4
Your overall time: 211.8
Your average was: 42.36
Your fastest lap: 39.4
Your slowest lap: 44.0
Enter a target lap time: 42.5
Lap 0 was faster than the target time
Lap 1 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was 42.3
Lap 2 was 42.1
Lap 3 was 44.0
Lap 4 was 44.0
Lap 5 was 39.4

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

PARTLY

The program identified the laps that were faster than the target lap time, but it did not count how many laps were equal to or faster than the target. It also displayed the lap numbers starting from 0 instead of 1. This statistic is partly complete in the original code

Test:

Statistic 6 - Whether each lap was faster or slower than the previous one

Screenshot(s) of output:

```
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Script
Enter a lap time: 42.3
Enter a lap time: 42.1
Enter a lap time: 44
Enter a lap time: 44
Enter a lap time: 39.4
Your overall time: 211.8
Your average was: 42.36
Your fastest lap: 39.4
Your slowest lap: 44.0
Enter a target lap time: 42.5
Lap 0 was faster than the target time
Lap 1 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was 42.3
Lap 2 was 42.1
Lap 3 was 44.0
Lap 4 was 44.0
Lap 5 was 39.4

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

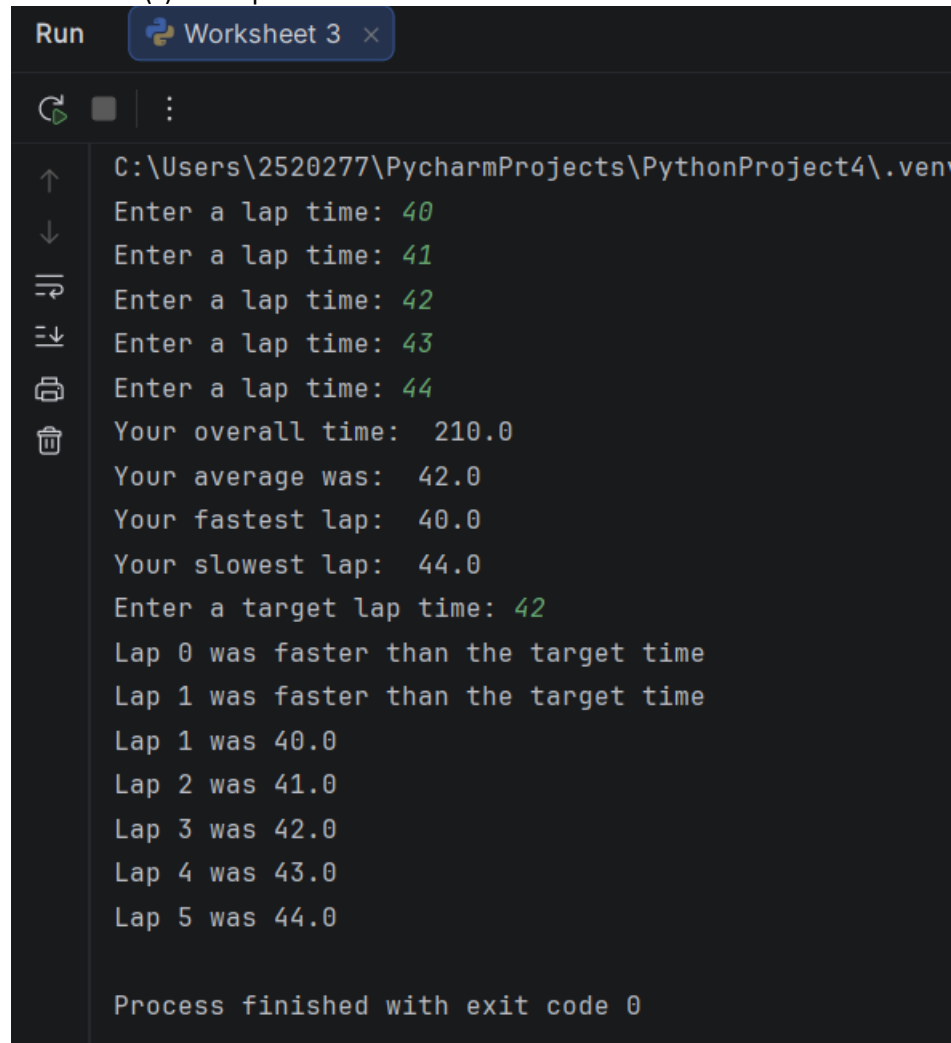
UNFINISHED

The program did not show whether each lap was faster or slower than the previous lap. It only printed the lap times individually. This statistic was unfinished in the original Version 1 code and should be added in the revised version.

Test:

Section 2c — Further test set 1: increasing lap times.

Screenshot(s) of output:



```
Run Worksheet 3 x
C:\Users\2520277\PycharmProjects\PythonProject4\.venv
Enter a lap time: 40
Enter a lap time: 41
Enter a lap time: 42
Enter a lap time: 43
Enter a lap time: 44
Your overall time: 210.0
Your average was: 42.0
Your fastest lap: 40.0
Your slowest lap: 44.0
Enter a target lap time: 42
Lap 0 was faster than the target time
Lap 1 was faster than the target time
Lap 1 was 40.0
Lap 2 was 41.0
Lap 3 was 42.0
Lap 4 was 43.0
Lap 5 was 44.0

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

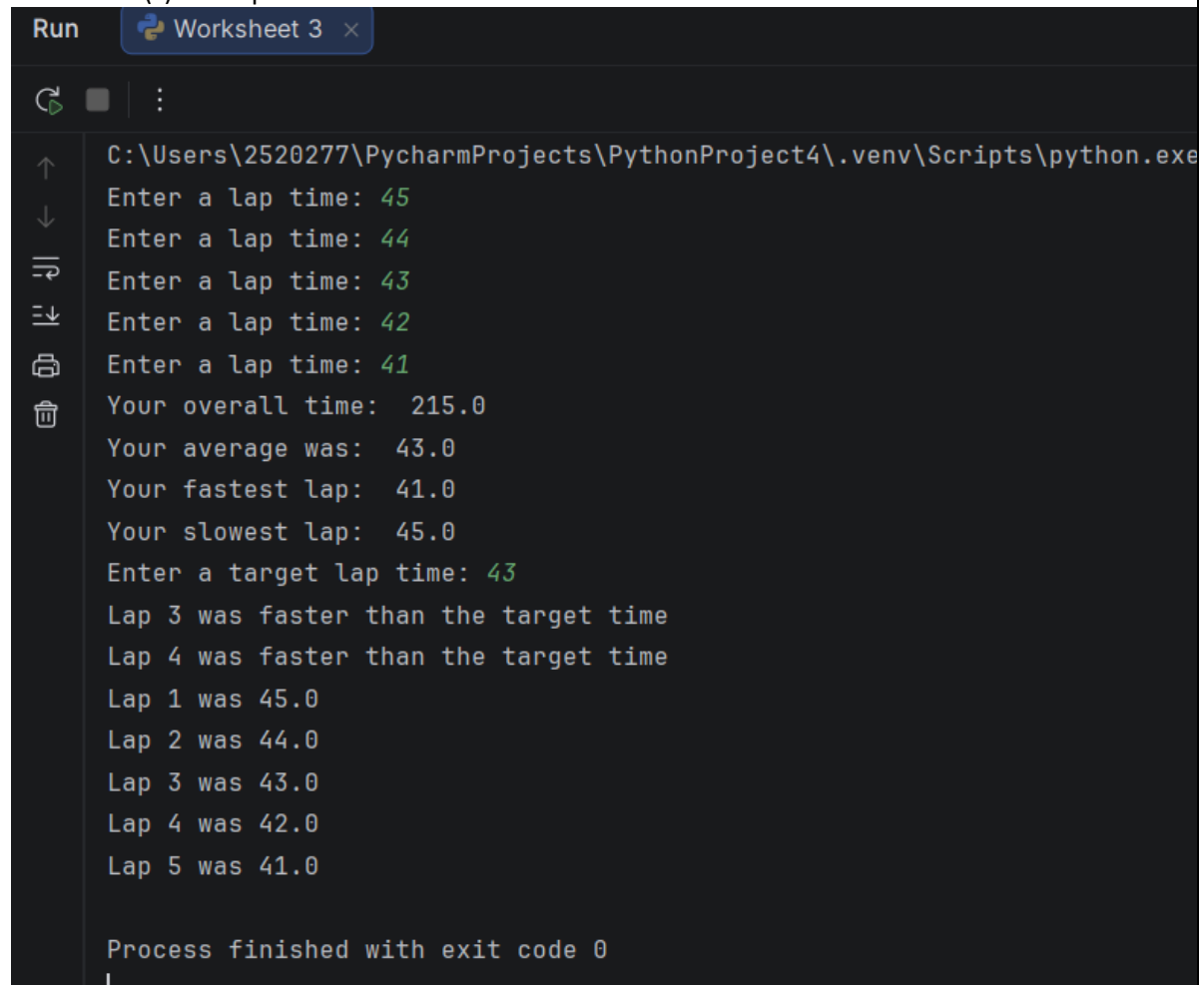
PARTLY

The program accepted all five lap times and calculated the overall time, average, fastest lap time and slowest lap time correctly. The total was 210.0 seconds, and the average was 42.0 seconds. However, the program did not fully meet the target lap requirement because it only displayed laps faster than the target, not laps equal to or faster than the target. Lap 3 was exactly 42.0 seconds, so it should have counted as meeting the target, but it was not displayed. The program also displayed lap numbers starting at Lap 0, which could confuse the user.

Test:

Section 2c — Further test set 2: decreasing lap times.

Screenshot(s) of output:



```
C:\Users\2520277\PycharmProjects\PythonProject4\.venv\Scripts\python.exe
Enter a lap time: 45
Enter a lap time: 44
Enter a lap time: 43
Enter a lap time: 42
Enter a lap time: 41
Your overall time: 215.0
Your average was: 43.0
Your fastest lap: 41.0
Your slowest lap: 45.0
Enter a target lap time: 43
Lap 3 was faster than the target time
Lap 4 was faster than the target time
Lap 1 was 45.0
Lap 2 was 44.0
Lap 3 was 43.0
Lap 4 was 42.0
Lap 5 was 41.0

Process finished with exit code 0
```

Result: Did the programme behave as expected ie syntactically and logically correct?

PARTLY

The program accepted all five lap times and calculated the overall time, average, fastest lap time and slowest lap time correctly. The total was 215.0 seconds, and the average was 43.0 seconds. However, the target lap time section is still incomplete because the program only displays laps faster than the target, not laps equal to or faster than the target. Lap 3 was exactly 43.0 seconds, so it should have counted as meeting the target, but it was not displayed. The program also does not count the number of laps that met the target.

3. Consider the results of the above tests and revisit your original code in order to address any tests that failed and/or improve code efficiency.

(Note: you may not be able to solve all of the problems that were encountered, but solve as many as you can.)

Paste your full revised code here :

[Copy and paste your full revised code here – note, do not use a screenshot]

```
laps = []
target = []

for counter in range(0, 5, 1):
    driverLaps = float(input("Enter a lap time: "))

    while driverLaps <= 0 or driverLaps > 300:
        print("Invalid lap time. Please enter a reasonable lap time.")
        driverLaps = float(input("Enter a lap time: "))

    laps.append(driverLaps)

total = sum(laps)
print("Your overall time: ", total)

average = total / len(laps)
print("Your average was: ", average)

minNumber = min(laps)
fastestLap = laps.index(minNumber) + 1
print("Your fastest lap was Lap", fastestLap, "with a time of", minNumber)

maxNumber = max(laps)
slowestLap = laps.index(maxNumber) + 1
print("Your slowest lap was Lap", slowestLap, "with a time of", maxNumber)

driverTarget = float(input("Enter a target lap time: "))

while driverTarget <= 0 or driverTarget > 300:
    print("Invalid target lap time. Please enter a reasonable target lap time.")
    driverTarget = float(input("Enter a target lap time: "))

targetCount = 0

for counter in range(0, 5, 1):
    if laps[counter] <= driverTarget:
        targetCount = targetCount + 1
        print("Lap", counter + 1, "was equal to or faster than the target time")

print("The number of laps equal to or faster than the target time was:", targetCount)

print("Lap 1 was", laps[0])
```

```
print("Lap 2 was", laps[1])
print("Lap 3 was", laps[2])
print("Lap 4 was", laps[3])
print("Lap 5 was", laps[4])

for counter in range(1, 5, 1):
    if laps[counter] < laps[counter - 1]:
        print("Lap", counter + 1, "was faster than the previous lap")
    elif laps[counter] > laps[counter - 1]:
        print("Lap", counter + 1, "was slower than the previous lap")
    else:
        print("Lap", counter + 1, "was the same as the previous lap")
```