

2331962 Olcay Sivas

by Olcay Sivas

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Name: Olcay Sivas

Student Number: 2331962

WORKSHEET 3 – TESTING (Lap Times)

1. Original code:

```
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>
#include <string.h>
#include <math.h>

void main()
{
    float lap[5], overall, fast, slow, average, target;
    int fastlaptime, slowlaptime, better;

    printf("Welcome to the Racing Stats program:\n ");
    printf("Please enter the latest lap times...(in seconds)\n");

    for (int i = 0; i < 5; i++)
    {
        printf("Lap %d ", i + 1);
        scanf("%f", &lap[i]);

        while (lap[i] < 1)
        {
            printf("Sorry, please enter a positive number ");
            scanf("%f", &lap[i]);
        }
    }

    printf("What is your target lap time? \n");
    scanf("%f", &target);
    while (target < 0)
    {
        printf("Sorry target time can not be negative please try again: ");
        scanf("%f", &target);
    }
}
```

```

printf("Your statistics...\n");
overall = lap[0] + lap[1] + lap[2] + lap[3] + lap[4];

printf("1. Overall time for 5 laps was: %f\n", overall);

average = overall / 5;
printf("2. Average lap time was: %f\n", average);

fast = lap[0];

for (int i = 0; i < 5; i++)
{
    if (lap[i] < fast)
    {
        fast = lap[i];
        fastlaptime = i+1;
    }
}

printf("3. The fastest lap was lap %d in %f seconds\n",fastlaptime, fast);

slow = lap[0];
for (int i = 0; i < 5; i++)
{
    if (lap[i] > slow)
    {
        slow = lap[i];
        slowlaptime = i;
        slowlaptime++;
    }
}

printf("4. The slowest lap was %d in %f seconds\n",slowlaptime, slow);

better = 0;
for (int i = 0; i < 5; i++)
{
    if (lap[i] <= target)
    {
        better++;
    }
}
printf("5. %d of your laps were better than or equal to your target\n ", better);

printf("6. \n ");
printf("Lap 1 was %.1f\n", lap[0]);

for (int i = 1; i < 5; i++)
{
    printf("Lap %d was %.1f which was", i + 1, lap[i]);
}

```

```
        if (lap[i] < lap[i - 1])
        {
            printf("faster than the previous lap\n");
        }
        else if (lap[i] > lap[i - 1])
        {
            printf("slower than the previous lap\n");
        }
        else
        {
            printf("equal to the previous lap\n");
        }
    }
```

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

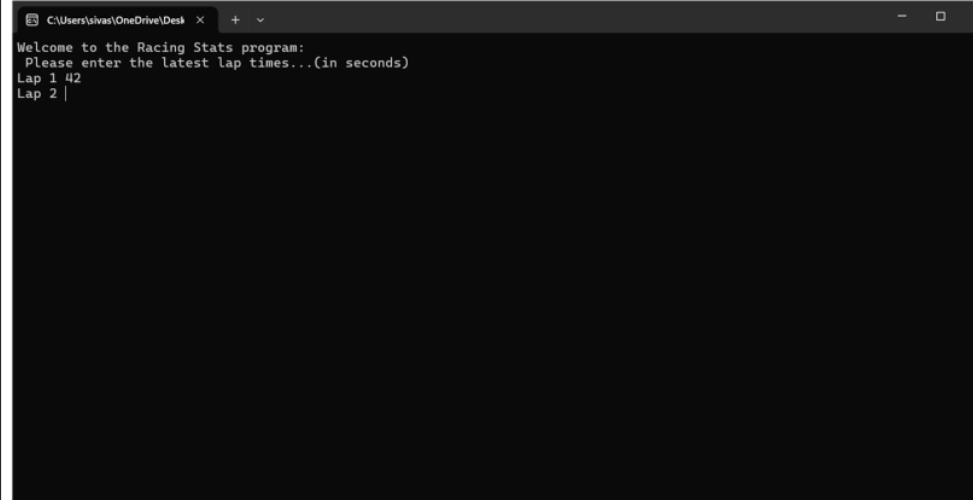
Examine each statistic (1-6) and comment on whether the correct answer(s) are displayed or not. (If any statistics were incomplete after Phase 1 (code completed in class) simply write "Unfinished")

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

Template for tests:

Test: i) 42 seconds

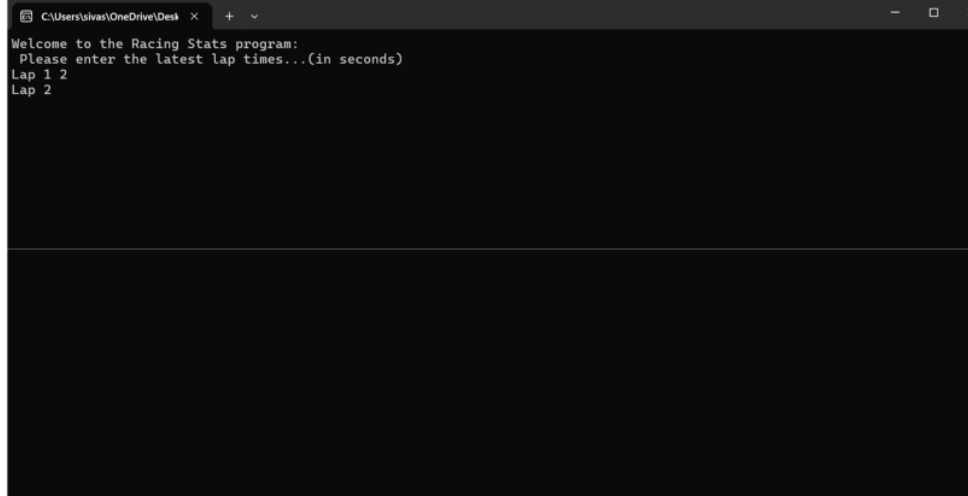
Screenshot(s) of output:



Result: Did the programme behave as expected ie syntactically and logically correct?
Yes, 42 was accepted as a positive value.

Test: ii) 2 seconds

Screenshot(s) of output:

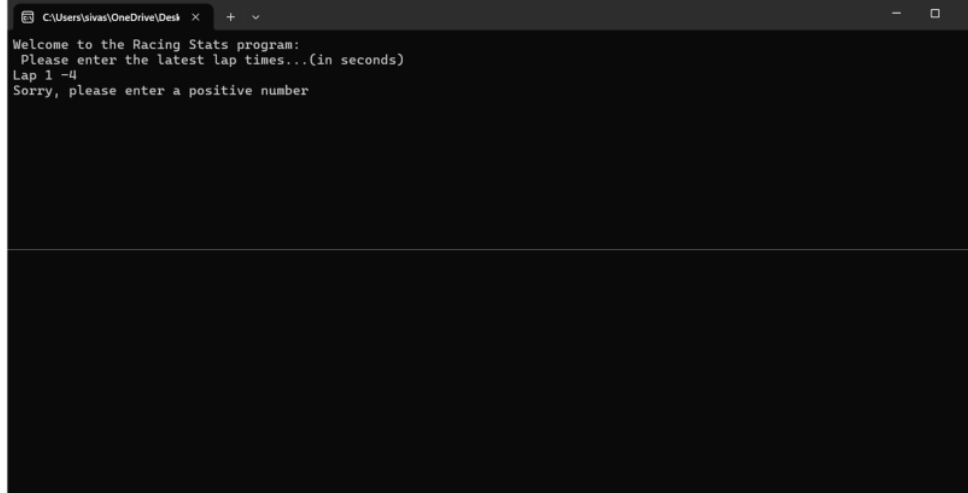


```
C:\Users\slvas\OneDrive\Desktop >
Welcome to the Racing Stats program:
Please enter the latest lap times...(in seconds)
Lap 1 2
Lap 2
```

Result: Did the programme behave as expected ie syntactically and logically correct?
Yes, the answer "2" was accepted as a positive number.

Test: iii) -4 seconds

Screenshot(s) of output:

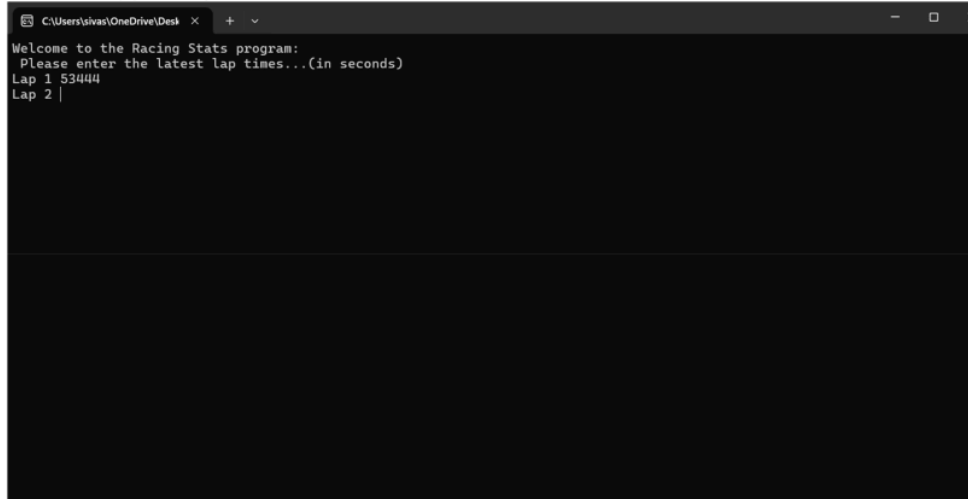


```
C:\Users\silvas\OneDrive\Desktop
Welcome to the Racing Stats program:
Please enter the latest lap times...(in seconds)
Lap 1 -4
Sorry, please enter a positive number
```

Result: Did the programme behave as expected ie syntactically and logically correct?
Yes, the negative value was rejected by the program and the user was asked to put enter a positive input.

Test: iv) 53444 seconds

Screenshot(s) of output:



```
C:\Users\silvas\OneDrive\Desktop
Welcome to the Racing Stats program:
Please enter the latest lap times...(in seconds)
Lap 1 53444
Lap 2 |
```

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

No, an unrealistic value i.e. 53444, which corresponds to a lap time of nearly 8 hours was accepted as a valid positive number by the program. This demonstrated to the user that the code was missing an upper limit check.

i) Test: v) Test the target lap time – show that the values entered are reasonable

Screenshot(s) of output:

```
Microsoft Visual Studio Debug  x + v
Welcome to the Racing Stats program:
Please enter the latest lap times...(in seconds)
Lap 1 42.3
Lap 2 42.1
Lap 3 44
Lap 4 44
Lap 5 39.4
What is your target lap time?
40
Your statistics...
1. Overall time for 5 laps was: 211.799988
2. Average lap time was: 42.359997
3. The fastest lap was lap 5 in 39.400002 seconds
4. The slowest lap was 3 in 44.000000 seconds
5. 1 of your laps were better than or equal to your target
6.
Lap 1 was 42.3
Lap 2 was 42.1 which was faster than the previous lap
Lap 3 was 44.0 which was slower than the previous lap
Lap 4 was 44.0 which was equal to the previous lap
Lap 5 was 39.4 which was faster than the previous lap

C:\Users\sivas\OneDrive\Desktop\Software\testsheet assignment\x64\Debug\testsheet assignment.exe (process 42532) exited
with code 0 (0x0).
Press any key to close this window . . .
```

Result: Did the programme behave as expected ie syntactically and logically correct?
Yes, the program was able to tell the user that only one lap was equal to or better than the target lap time.

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

Screenshot(s) of output:

```
Microsoft Visual Studio Debug  x + v
Welcome to the Racing Stats program:
Please enter the latest lap times...(in seconds)
Lap 1 42.3
Lap 2 42.1
Lap 3 44
Lap 4 44
Lap 5 39.4
What is your target lap time?
40
Your statistics...
1. Overall time for 5 laps was: 211.799988
2. Average lap time was: 42.359997
3. The fastest lap was lap 5 in 39.400002 seconds
4. The slowest lap was 3 in 44.000000 seconds
5. 1 of your laps were better than or equal to your target
6.
Lap 1 was 42.3
Lap 2 was 42.1 which was faster than the previous lap
Lap 3 was 44.0 which was slower than the previous lap
Lap 4 was 44.0 which was equal to the previous lap
Lap 5 was 39.4 which was faster than the previous lap

C:\Users\sivas\OneDrive\Desktop\Software\testsheet assignment\x64\Debug\testsheet assignment.exe (process 42532) exited
with code 0 (0x0).
Press any key to close this window . . .
```

Result: Did the programme behave as expected ie syntactically and logically correct?
Yes, the program was able to identify the fastest and the slowest lap correctly and which lap was faster than previous one and also which lap was slower than previous one correctly as well.

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

Screenshot(s) of output:

The screenshot shows a Windows desktop with a dark theme. In the background, a terminal window is open, displaying the output of a program named 'Racing Stats'. The program prompts for lap times and a target lap time, then displays statistics for 5 laps. The statistics show an overall time of 150.000000 seconds and an average lap time of 30.000000 seconds.

In the foreground, a 'Microsoft Visual C++ Runtime Library' error dialog box is displayed. The dialog has a title bar with the text 'Microsoft Visual C++ Runtime Library' and a close button. The main content area contains a red 'X' icon and the following text:

Debug Error!

Program: ..\tware\testsheet assignment\64\Debug\testsheet assignment.exe
Module: ..\tware\testsheet assignment\64\Debug\testsheet assignment.exe
File:

Run-Time Check Failure #3 - The variable 'fastlaptime' is being used without being initialized.

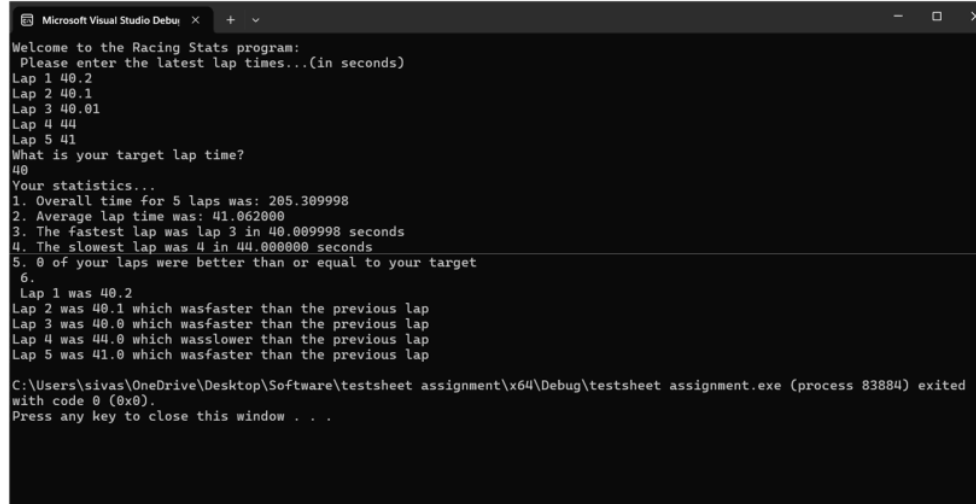
(Press Retry to debug the application)

At the bottom of the dialog, there are three buttons: 'Abort', 'Retry', and 'Ignore'. The 'Retry' button is highlighted.

Result: Did the programme behave as expected ie syntactically and logically correct?
No, the program failed to identify lap 1 as the fastest lap and gave an error. The error was caused by a line in coding which was caused an error if the lap 1 was the fastest.

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

Screenshot(s) of output:



```
Microsoft Visual Studio Debug x + v
Welcome to the Racing Stats program:
Please enter the latest lap times...(in seconds)
Lap 1 40.2
Lap 2 40.1
Lap 3 40.01
Lap 4 44
Lap 5 41
What is your target lap time?
40
Your statistics...
1. Overall time for 5 laps was: 205.309998
2. Average lap time was: 41.062000
3. The fastest lap was lap 3 in 40.009998 seconds
4. The slowest lap was 4 in 44.000000 seconds
5. 0 of your laps were better than or equal to your target
6.
Lap 1 was 40.2
Lap 2 was 40.1 which was faster than the previous lap
Lap 3 was 40.0 which was faster than the previous lap
Lap 4 was 44.0 which was slower than the previous lap
Lap 5 was 41.0 which was faster than the previous lap
C:\Users\sivas\OneDrive\Desktop\Software\testsheets assignment\x64\Debug\testsheets assignment.exe (process 83884) exited
with code 0 (0x0).
Press any key to close this window . . .
```

Result: Did the programme behave as expected ie syntactically and logically correct?
Yes, The program was able to detect all the laps correctly.

Test:

Screenshot(s) of output:

Result: Did the programme behave as expected ie syntactically and logically correct?
YES/NO (delete as appropriate)
If YES, comment on what happened.
If NO, what went wrong and why? Suggest how things could be improved

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 :

```
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>
#include <string.h>
#include <math.h>

void main()
{
    float lap[5], overall, fast, slow, average, target;
    int fastlaptime = 1, slowlaptime = 1, better;

    printf("Welcome to the Racing Stats program:\n");
    printf("Please enter the latest lap times...\n");

    for (int i = 0; i < 5; i++)
    {
        printf("Lap %d: ", i + 1);
        scanf("%f", &lap[i]);

        while (lap[i] <= 0 || lap[i] > 10000)
        {
            printf("Error: Please enter a realistic positive number (1-10000): ");
            scanf("%f", &lap[i]);
        }
    }

    printf("\nWhat is your target lap time? ");
    scanf("%f", &target);
    while (target < 0)
    {
        printf("Sorry target time can not be negative please try again: ");
        scanf("%f", &target);
    }

    printf("\nYour statistics...\n");
    overall = lap[0] + lap[1] + lap[2] + lap[3] + lap[4];

    printf("1. Overall time for 5 laps was: %.2f seconds\n", overall);

    average = overall / 5;
    printf("2. Average lap time was: %.2f seconds\n", average);
}
```

```

fast = lap[0];
for (int i = 0; i < 5; i++)
{
    if (lap[i] < fast)
    {
        fast = lap[i];
        fastlaptime = i + 1;
    }
}
printf("3. The fastest lap was lap %d in %.2f seconds\n", fastlaptime, fast);

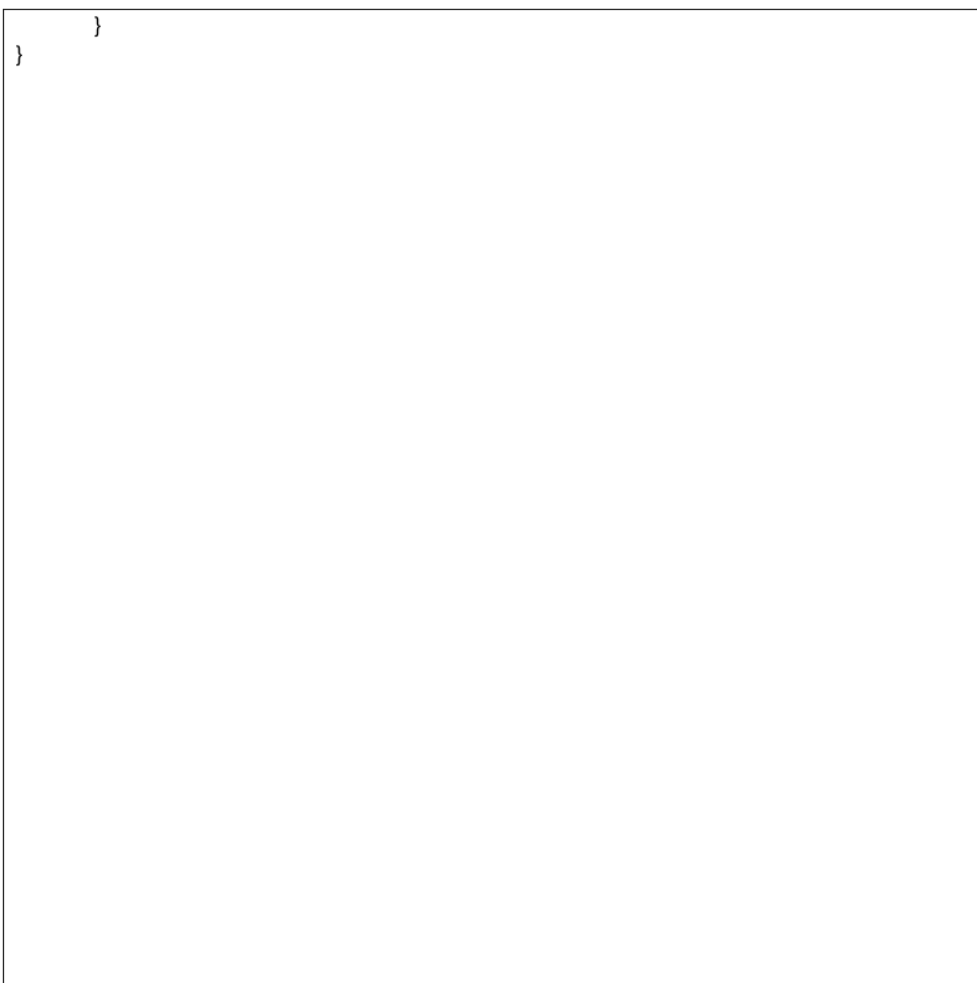
slow = lap[0];
for (int i = 0; i < 5; i++)
{
    if (lap[i] > slow)
    {
        slow = lap[i];
        slowlaptime = i + 1;
    }
}
printf("4. The slowest lap was lap %d in %.2f seconds\n", slowlaptime, slow);

better = 0;
for (int i = 0; i < 5; i++)
{
    if (lap[i] <= target)
    {
        better++;
    }
}
printf("5. %d of your laps were better than or equal to your target\n", better);

printf("\n6. Lap Comparison:\n");
printf("Lap 1 was %.2f\n", lap[0]);

for (int i = 1; i < 5; i++)
{
    printf("Lap %d was %.2f which was ", i + 1, lap[i]);
    if (lap[i] < lap[i - 1])
    {
        printf("faster than the previous lap\n");
    }
    else if (lap[i] > lap[i - 1])
    {
        printf("slower than the previous lap\n");
    }
    else
    {
        printf("equal to the previous lap\n");
    }
}

```



FINAL GRADE

13/0

GENERAL COMMENTS

WORKSHEET 3

Coding- 10000 is a bit too much for a laptime. Also, even Superman :) couldn't do a lap in 0 seconds, so a realistic number lower number would be 30-40 perhaps.

Target lap time needs validating - again, needs a realistic minimum and maximum.

It is better to use a loop to add the numbers in the array - it gives scope to expand the program.

There is a some scope to combine the loops for statistics 3 and 4 for efficiency of code.

Although there are some points to address above, overall you've got the core features working well.

7/10

Testing - Be careful to think about logic errors as well as syntax errors when testing - nobody could do a lap in 2 seconds, so test 1 is not logically correct. Same with target lap as detailed above - test a wider range of values. On test e) you say the error was caused by a line in coding- it would be good to show this line as part of your explanation. Other than the above a decent discussion.

6.5/10

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