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1. The first challenge I faced while working on this project was to make sure that ‘:’ was considered to be a valid input at the start of the string if the no. of minutes was 0. I managed to do this by slightly modifying the number function so that it gave a different return value if ‘:’ was the first input after the whitespace. The next hurdle was to make sure that values such as :7 or 23:5 were false but :07 or 23:05 were true. This was done by creating two cases after a colon appeared on the code (in one case, the next character was 0, in the other it was between 1 and 9) and executing each case differently. After these two hurdles, the rest of the project was simply implementing the number function according to given parameters and testing it.
2. Pseudocode:

The function evaluates step-by-step:

* It first checks if the string starts with a ‘:’ or integer from 1 to 9 and checks if the minutes have been entered correctly.
* It then checks if the colon is correctly space right before or between the minutes and seconds.
* It then checks if the seconds have been entered correctly.
* In the previous three steps it also considers cases where the seconds starts with ‘0’ value.
* It then checks if strokes per minute along with the string “ s/m “ is entered correctly.
* It then checks if distance along with “ m “ is entered correctly.
* It then checks if heartbeats is entered correctly, and there no characters after heartbeats.
* Each of the other functions then use isValidRowerString to determine if the string entered is as per specifications. They then run along the length of the string until they find the desired value for the respective function.

c) Test data that can be used for this program:

1. (:14 56 s/m 42 m 110) – determine if isValidRowerString is true when the number of minutes = 0 and the string starts with a colon.
2. (00:23 55 s/m 45 m 117) – determine whether isValidRowerString is false when no. of minutes = 0 but leading zeroes are present.
3. ( 4:22 45 s/m 46 m 98) – determine whether isValidRowerString is true when there are leading whitespace before the stopwatch)
4. (4: 22 45 s/m 46 m 98) - determine whether isValidRowerString is false when there is a whitespace between the “:” and no. of seconds elapsed.
5. ( 5 :43 45 s/m 46 m 98) - determine whether isValidRowerString is false when there is a whitespace between the no. of minutes and the “:”.
6. ( a:23 45 s/m 46 m 98) - determine whether isValidRowerString is false when first character is not a number.
7. ( 1b:23 45 s/m 46 m 98) – determine whether isValidRowerString is false when the first numeric value contains a character in between.
8. ( 12:d6 45 s/m 46 m 98) – determine whether isValidRowerString is false when the first numeric value contains a character in between.
9. ( 15:4$ 45 s/m 46 m 98) - determine whether isValidRowerString is false when the first numeric value contains a character in between.
10. ( 000015:22 45 s/m 46 m 98) - determine whether isValidRowerString is false when no. of minutes > 0 but leading zeroes are present.
11. ( 015:22 45 s/m 46 m 98) - determine whether isValidRowerString is false when no. of minutes > 0 but leading zeroes are present.
12. ( 17:043 45 s/m 46 m 98) - determine whether isValidRowerString is false when no. of seconds > 0 but leading zeroes are present.
13. ( 12:3 45 s/m 46 m 98) - determine whether isValidRowerString is false when no. of seconds < 10 but only one integer is available for seconds.
14. ( 12:03 45 s/m 46 m 98) - determine whether isValidRowerString is true when no. of seconds < 10)
15. ( 12:003 45 s/m 46 m 98) - determine whether isValidRowerString is false when no. of seconds < 10 and there are leading zeroes present.
16. ( 12:00003 45 s/m 46 m 98) - determine whether isValidRowerString is false when no. of seconds < 10 and there are leading zeroes present.
17. ( 12:400 45 s/m 46 m 98) - determine whether isValidRowerString is false when no. of seconds > 60.
18. ( 72:40 45 s/m 46 m 98) - determine whether isValidRowerString is false when no. of minutes > 60.
19. (32:40 45 s/m 46 m 98) - determine whether isValidRowerString is true when all fields are entered correctly.
20. (:0014 56 s/m 42 m 110) – determine if isValidRowerString is false when the number of minutes = 0 and the string starts with a colon with leading zeroes present.
21. ( : 10 45 s/m 46 m 98) - determine if isValidRowerString is false when the number of minutes = 0 and there is a space between the colon and number of seconds.
22. ( 12:43 0 s/m 46 m 98) - determine if isValidRowerString is false when strokes/minute < 1.
23. ( 12:43 00045 s/m 46 m 98) - determine if isValidRowerString is false when strokes/minute is preceded by leading zeroes.
24. ( 12:43 -45 s/m 46 m 98) - determine if isValidRowerString is false when strokes/minute is negative.
25. ( 12:43 45 s/m 46 m 98) – determine if isValidRowerString is false when there is more than one whitespace between strokes/minute and “s/m“.
26. ( 12:43 45 s/ m 46 m 98) - determine if isValidRowerString is false when “ s/m” is not entered properly.
27. ( 12:43 45s/m 46 m 98) – determine if isValidRowerString is false when there is no whitespace between strokes/minute and “s/m“.
28. ( 12:43 43 s/m 46 m 98) – determine if isValidRowerString is true when there is leading whitespace between time elapsed and strokes/minute.
29. ( 12:43 43 s/m 46 m 98) – determine if isValidRowerString is true when entered correctly.
30. ( 12:43 1000 s/m 46 m 98) - determine if isValidRowerString is false when strokes/minute > 999.
31. ( 12:43 1000 s/m 46 m 98) - determine if isValidRowerString is false when there is more than one whitespace between distance and “ m “.
32. ( 12:43 1000 s/m 46m 98) - determine if isValidRowerString is false when there is no whitespace between distance and “ m “.
33. ( 12:43 1000 s/m 0 m 98) - determine if isValidRowerString is false when distance < 1.
34. ( 12:43 1000 s/m 463 m 98) - determine if isValidRowerString is true when there is leading whitespace between s/m and distance.
35. ( 12:43 1000 s/m 0000463 m 98) - determine if isValidRowerString is false when there are leading zeroes before distance.
36. ( 12:43 1000 s/m 0000463 M 98) - determine if isValidRowerString is false when m is not entered correctly.
37. ( 12:43 43 s/m 46 m 098) – determine if isValidRowerString is false when heartbeat is preceded by leading zeroes.
38. ( 12:43 43 s/m 46 m 8888) – determine if isValidRowerString is false when heartbeat exceeds 999.
39. ( 12:43 43 s/m 46 m 0) – determine if isValidRowerString is false when heartbeat<1.
40. ( 12:43 43 s/m 46 m 19a8) – determine if isValidRowerString is false when there are characters in between heartbeat.
41. ( 12:43 43 s/m 46 m %8) – determine if isValidRowerString is false when heartbeat starts with a character.
42. ( 12:43 43 s/m 46 m 118) – determine if isValidRowerString is true when there is leading whitespace between heartbeat and distance covered.
43. ( 12:43 43 s/m 46 m 108 ddddh ) – determine if isValidRowerString is false when heartbeat ends with a non-integer, i.e., there are still characters after heartbeat.

For the remaining functions, the same data can be used to test if they are working or not, as they are all dependent on isValidRowerString().