Name:
Year 11 Interleaved Homework 2

SCAN ME

1. Explain the term "Algorithm"

Set of steps to solve a problem

2. Here is a list of numbers that need to be sorted.

   a. Show the first pass of a Bubble Sort. The shaded boxes have been included to help guide you.

23	12	76	17	21	16	3
12	23					
	23	76				
		17	76			
			21	76		
				16	76	
					3	76

   b. How many passes through the list will be required to sort the numbers into ascending sequence using the bubble sort algorithm?

6

   c. State one disadvantage of a Merge Sort compared to a Bubble Sort

Shorter on large lists

3. Here is a list of items

Apple	Banana	Chair	Desk	Elephant	Lamp	Zebra

   a. State what items would be examined when using a **Linear Search** to find "Elephant"

Apple, Banana, Chair, Desk, Elephant

   b. State what items would be examined when using a **Binary Search** to find "Elephant"

Desk, Lamp, Elephant

   c. If the list was to increase to 27 different items, calculate the maximum number of comparisons it would take to find an item using a binary search

5

4. Apply a Merge sort to this set of data

23	15	14	86

23 15 14 86

23 15 14 86

15 23 14 86

14 15 23 86

5. Review the python code below

```
scores = [70, -10, 40, -20, 30]
average = 0
total = 0
index = 0
WHILE index < 5:
     total = total + scores[index]
     index = index + 1

average = total / 5

print(average)
```

a. Complete the trace table

average	total	index	i < 5	Output
0	0	0	True	
	70	1		
	60	2		
	100	3		
	80	4		
	110	5		
22			False	22

b. What programming constructs are present in this algorithm

Sequence	✓
Selection	
Iteration	✓

6. Write a Python program that tracks a participant's progress in a fitness challenge based on the number of kilometers they have run.

Your program should:

- Ask the user to input the number of kilometers a participant has run (they should enter a number between 1 and 50 inclusive; if the number falls outside this range, prompt them to re-enter a valid number).
- If a participant has run 50 kilometers, output "You have completed the Fitness Challenge!"
- If a participant has run more than 25 kilometers, output "You are over halfway to completing the Fitness Challenge!"
- Continue looping until the user enters -1, which will stop the program.

```
loop = True
while loop:
    km = int(input())
    if km == -1:
        loop = False
    if loop:
        while (km < 1 or km > 50) and loop:
            km = int(input())
            if km == -1:
                loop = False
        if loop:
            if km == 50:
                print("You have completed the fitness challenge")
            elif km > 25:
                print("You are over half way to completing the
                Fitness Challenge")
```