Name: Ethan Armstrong

Year 11 Interleaved Homework 3

1. Shift the following binary number right 3 spaces.

1	0	1	0	1	0	0	1
0	0	0	1	0	1	0	1

2. What is the arithmetic effect of the above shift?

Divide by 8

3. Add the following binary numbers together.

a.

	0	1	1	0	1	0	1	1
	1	0	1	0	0	1	0	1
	0	0	0	1	1	0	1	1
1	0	0	1	0	1	0	1	1

b.

	1	1	1	1	0	0	0	1
	1	0	0	0	0	0	0	0
	0	0	1	1	1	1	1	0
1	1	0	1	0	1	1	1	1

c. Explain what error has occurred in the calculation above.

Overflow error – when 8 bit binary addition results in 9 bits

4. Here is a list of numbers

32	15	79	243	7	41	192

a. Explain why a binary search cannot be used on this list.

The list is not sorted, and binary searches requires the data to be in ascending order

b. State what items would be examined when using a Linear Search to find 7.

32, 15, 79, 243, 7

c. What algorithms could you use to make this list suitable for a Binary Search?

Merge Sort

5. Perform the first pass of a Bubble Sort on this set of data.

23	15	14	86
15	23	14	86
15	14	23	86

6. Review the Python code below

```
1. for i in range(0, len(arr) - 1):
2.     for j in range(0, len(arr) - 1):
3.         if arr[j] > arr[j + 1]:
4.             temp = arr[j]
5.             arr[j] = arr[j + 1]
6.             arr[j + 1] = temp
```

a. Complete the trace table

i	j	arr[j]	arr[j+1]	temp

arr undefined, question not possible

b. What programming constructs are present in this algorithm?

- Sequence ☑
- Selection ☑
- Iteration ☑

c. What is the purpose of the program?

Perform a bubble sort

7. Write a Python program that tracks a participant's progress in a reading challenge based on the number of books they have read.

Your program should:

- Ask the user to input the number of books a participant has read (they should enter a number between 1 and 30 inclusive; if the number falls outside this range, prompt them to re-enter a valid number).
- If a participant has read more than 25 books, output "You have completed the Reading Challenge!"
- If a participant has read more than 15 books, output "You are over halfway to completing the Reading Challenge!"
- Continue looping until the user enters -1, which will stop the program.

```
while True:
    books = int(input())

    while (books < 1 or books > 30) and books != -1:
        books = int(input())

    if books == -1:
        break

    if books > 25:
        print("You have completed the Reading
Challenge!")
    elif books > 15:
        print("You are over half way to completing the
Reading Challenge!")
```