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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

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

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!")
```