

Year 12 HL

Homework 1: Recursion

- 1) For the following sequences find the base case and the general case.
 - a) $F(n) = 1 + 2 + 3 + 4 + \dots + n$
 - b) $S(n) = 2^1 + 2^2 + 2^3 + \dots + 2^n$
 - c) $Fr(p, q) = p^1 + p^2 + p^3 + \dots + p^q$

Homework 2: Sorting

- 1) Sort the following numbers in ascending order using the Bubble Sort.
5, 8, 3, 2, 6

Homework 3: Data Structures

- 1) What is the difference between static and dynamic data structures?
- 2) Name two differences between one-dimensional arrays and records.
- 3) Consider the following one-dimensional array named 'temp'.

0	1	2	3	4	5	6	7	8	9
3	6	-2	0	1	4	7	5	5	-8

- a) What is the value of the following expressions?
 - i) $temp[1] + 3 * temp[4]$
 - ii) $temp[2+3] + 10$
 - b) What changes are imposed on the array after the following assignment statements?
 - i) $temp[7] = -2;$
 - ii) $temp[4] = temp[4] + 2;$
 - iii) $i = 3;$
 $temp[i] = temp[i] + temp[i+1];$
- 4) Question about the Stack.
 - a) By what other name is the Stack known?
 - b) If a stack STK is initially empty what will it contain after the following operations?
Push (STK, 4)
Push (STK, 2)
Push (STK, 7)
 $a = Pop (STK)$
 $b = Pop (STK)$
if $a > b$ then Push (STK, a) else Push (STK, b)
Push (STK, a+b)
- 5) Question about the Queue.
 - a) By what other name is the Queue known?

b) If a queue KU is initially empty what will it contain after the following operations?

Enqueue (KU, 8);

Enqueue (KU, 3);

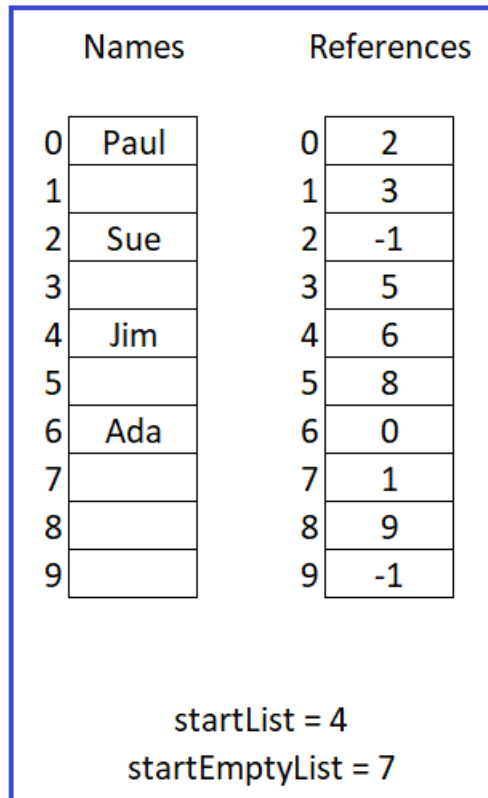
Enqueue (KU, 5);

a = Dequeue (KU);

b = Dequeue (KU);

Enqueue (KU, 7);

6) A linked list is implemented by means of two arrays and two references as shown in the following diagram.



Show how the data structure changes after the following operations

a) Insert Pat after Ada

b) Delete Paul

c) Insert Fran as the first name in the list.