University of Bordj Bou Arreridj
Faculty of MI — 1st Year Engineer
ASD Exam — Solution Sheet

✓ SOLUTION SHEET — ASD

Arrays · Pointers · Linked Lists · Recursion · Functions

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Total: 20 pts
1st Year Engineer

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Ex. 1 — Trace of mystery(6) :

```
mystery(6) = 6 + mystery(4)
mystery(4) = 4 + mystery(2)
mystery(2) = 2 + mystery(0)
mystery(0) = 0        ← base case (n ≤ 0)
mystery(2) = 2 + 0 = 2
mystery(4) = 4 + 2 = 6
mystery(6) = 6 + 6 = 12
```

Ex. 2 — Trace of compute(&a, b) with a=4, b=5 :

```
Line 5: *x = 4 * 2 = 8     → a is now 8
Line 6: y  = 5 + 3 = 8     → local copy only, b unchanged
Line 7: *x = 8 + 8 = 16    → a is now 16
Back in main: a=16, b=5
printf → "16 5"
```

Ex. 3 — Trace of transform(T, 4) with T={2,3,5,1} :

```
i=0: T[0] = T[0]+T[1] = 2+3 = 5
i=1: T[1] = T[1]+T[2] = 3+5 = 8
i=2: T[2] = T[2]+T[3] = 5+1 = 6
i=3: loop ends (3 < 4-1 is false)
T[3] = 1  (unchanged)
printf → "5 8 6 1"
```

Ex. 4 — Factorial errors :

```
Line 5: n==0 → should be n<=1 (or n==1)
         fact(0) with return 0 gives wrong results
Line 6: return 0 → should be return 1
         (1! = 1,  0! = 1,  not 0)
Line 7: fact(n) → infinite loop → should be fact(n-1)
Correct: fact(5)=5×4×3×2×1 = 120
```

Ex. 5 — Linked list 6→4→9→NULL, sum_list :

```
n1→val=6, n1→next→val=4, n1→next→next→val=9
sum_list: s=0 → s=0+6=6 → s=6+4=10 → s=10+9=19 → h=NULL → return 19
h!=NULL: loop condition — stops traversal when end of list is reached (NULL sentinel)
printf line 27-29: "6 4 9"   printf line 30: " 19"   →  Full output: "6 4 9 19"
```

Question ID	Student Answer	✓ Expected Answer	Pts
Exercise 1 — Recursive Function Trace			
[E1_Q1]		0	0.5 pt
[E1_Q2]		2	0.5 pt
[E1_Q3]		6	1 pt
[E1_Q4]		12	1 pt
[E1_Q5]		12	1 pt
Exercise 2 — Functions and Pointers			
[E2_Q1]		8 (4 × 2)	1 pt
[E2_Q2]		8 (5 + 3)	1 pt
[E2_Q3]		16 (8 + 8)	1 pt
[E2_Q4]		16 5	1 pt
Exercise 3 — Arrays and Pointer Arithmetic			
[E3_Q1]		5 (2+3)	0.5 pt
[E3_Q2]		8 (3+5)	1 pt
[E3_Q3]		6 (5+1)	1 pt
[E3_Q4]		1 (unchanged)	0.5 pt
[E3_Q5]		5 8 6 1	1 pt
Exercise 4 — Debugging (Recursive Factorial)			
[E4_Q1]		if (n <= 1) or if (n == 1)	1 pt
[E4_Q2]		return 1 (not 0)	1.5 pt

Question ID	Student Answer	✓ Expected Answer	Pts
[E4_Q3]		fact(n-1) (not fact(n))	1.5 pt
Exercise 5 — Linked List			
[E5_Q1]		6	0.5 pt
[E5_Q2]		4	0.5 pt
[E5_Q3]		9	0.5 pt
[E5_Q4]		Stops loop when end of list reached	0.5 pt
[E5_Q5]		19 (6+4+9)	1 pt
[E5_Q6]		6 4 9 19	1 pt

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