



Année Académique:

2025/2026

Domaine:

Sciences de la Matière

Filière:

Sciences de la matière

Spécialité:

sciences de la matière

Niveau:

Licence 1ère Année

Période:

Semestre 2

Matière

M213 Informatique 2 / Langages de Programmation

Enseignant:

BOUNEB Zine el abidine

Section/Groupe

Section 1

PV des notes des examens par matière (Enseignant)

#	Matricule	Nom	Prénom	Note Examen	Note corrigée	Signature
1	252534006314	ABDELLI	ASSIL	2.0		
2	252534067309	ABIDAT	SIDRA EL MARAME	0.0		
3	252534036501	ADDADI	MARAM ASSIL	0.0		
4	252534076609	ADMAM	NOUR EL HOUDA	1.0		
5	222234005818	AGGOUN	OUSSAMA	0.0		
6	252534036414	AGUEZLANE	MAYA LINA	0.0		
7	252534031115	AKACHAT	ROKIA	2.0		
8	242434043705	ALLAG	DOUAA	0.0		
9	252534010715	ALLAOUA	LINA	4.0		
10	252534044403	ANNAB	WIAM	0.0		
11	252534040513	ARRADJ	AMINA	0.0		
12	252534060614	ASSOUL	DHIA EDDINE	0.0		
13	202034004413	ATCHOUM	Abderaouf			
14	252534010702	ATOUT	AYA	2.0		
15	252534047417	BECHOUA	MALAK	1.0		
16	252534019814	BEGHOU	FARAH	0.0		
17	242434056401	BEKHOUCHE	MAYA	0.0		
18	252534021701	BEKKOUCHE	AMINA MALAK			
19	252534051719	BELFETNI	SELSABIL	0.0		
20	242534100204	BELKFIF	AHMED AMINE	3.0		
21	252534076812	BELKHIR	MERIEM			
22	242434044403	BELOUAR	ZOHEIR	5.0		
23	252534074402	BENKHELLEF	ACHOUAK	0.0		
24	252534047618	BENMAZOUZ	YAHIA			
25	232334097501	BENSLAMA	MOHAMMED			
26	252534036512	BENSMARA	YAMINA	0.5		
27	252534020814	BERHAILI	MALAK	1.0		
28	252534067705	BEZAZ	DIKRA	9.0		
29	252534010108	BOUCHEGRA	MAHDI	1.0		
30	252534081817	BOUCHELAGHEM	ANOUAR	2.0		
31	242534109103	BOUCHENAA	KALTHOUM	3.0		
32	252534047917	BOUCHIHA	ABD ELLAH	4.0		
33	252534044620	BOUDERBALA	HADIL	0.0		
34	252534111304	BOUDIAF	ACHWAK	0.0		
35	252534099913	BOUDJEDOUR	IKRAM	0.5		
36	191934003170	BOUGANDOURA	ISMAIL CHARAF			
37	252534108305	BOUHALI	AYA	1.0		
38	252534036312	BOUSSEKKINE	RITEDJ	0.0		
39	252534034406	BOUSSEKKINE	TAREK			
40	252534047920	BOUTERAA	LYNA	3.0		
41	252534008204	BOUZID	KACEM MOUATEZ	0.0		
42	252534052908	BRAHIMI	MALAK	1.0		
43	252534080605	BRIZA	BOUTHAINA	0.0		
44	252534051310	CHAIEB	OUMAIMA	1.0		
45	252534047005	CHAMEKH	KHADIDJA			
46	252534080611	CHEBOUKI	MANAR	1.0		
47	252534043202	CHERGUI	MOUNTASSAR	0.0		
48	242434063501	CHERIROU	IMANE	0.0		
49	242434030220	DEBBIH	OUMAIMA			
50	242434047911	DERDAZI	ABIR ERRAIHANE	0.0		
51	252534108814	DIB	SOUHIR			
52	252534044602	DJAMIL	ASSIA	6.5		
53	252534080610	DJELLAL	FAIZ	0.0		
54	252534010704	DJERMANE	IMENE	1.0		
55	252534021113	DJOUAK	HADJER	0.0		
56	252534047308	FADLOUN	FATIMA ZOHRA	1.0		
57	252534044617	FARH	FATMA ZOHRA	0.0		
58	252534074109	GAGAA	MERIEM	1.0		
59	252534044608	GHERBI	RIHAB	3.0		
60	252534041202	GHERRICHE	RAZIKA	0.0		
61	192234085901	GHODBANE	Khadidja			
62	252534101712	GHOUBAL	RANA	0.0		
63	242534098517	GUEMINI	AYA	12.5		
64	212134005144	GUERIOUN	CHERIF	0.0		
65	252534011610	GUERRAM	TEDJELBAHA	2.0		
66	252534036401	GUERZIZ	CHAHINEZ			
67	252534052518	HABES	WAIL	0.0		
68	242434006410	HADJ ZINE	AMEL	0.0		
69	252534016916	HAMAR	AYAT ERRAHMANE	10.5		
70	252534051914	HAMEL	TAHA MOUAZ			
71	252534036210	HAMIDATOU	ANFEL	0.0		
72	252534017508	HAMMA	AYHEM	0.0		
73	252534047302	HAMNI	ABDALLAH AHMED	1.0		
74	252534080604	HANNACHI	AMEL	10.0		
75	252534108816	HANTAS	CHAMES	0.0		
76	242434011909	HARAT	INSAF	0.0		

PV des notes des examens par matière (Enseignant)						
#	Matricule	Nom	Prénom	Note Examen	Note corrigée	Signature
77	252534044614	HEMAIZIA	CHAHD	1.0		
78	252534033709	ILIGH	HAYAM	0.0		
79	252534034719	ILIGH	HOUSNA			
80	252534008715	KAHOUL	MOHAMED	0.0		
81	252534036409	KALLAB DEBBIH	FARES			
82	252534047208	KANDOULI	CHEIMA	0.0		
83	202034011622	KATEB	SLIMAN			
84	252534022615	KEBAILI	BOCHRA			
85	252534010706	KHALED	KHIREDDINE	0.0		
86	242434072009	KHALFALLI	MERYEM			
87	252534042909	KHAMEDJ	AMAL			
88	252534021407	KHEMMAR	WALIEDDINE	1.0		
89	252534042512	KHENNOUS	HADIL	0.0		
90	252534036304	KITANI	DOURSSAF	1.0		
91	252534011601	KOUACHI	AYA	0.0		
92	252534053413	LAOUADI	ABD ERRAOUF	0.0		
93	252534057314	LOUAAR	RETAJ	2.5		
94	252534018816	MAKHLOUFI	ZAYNEB	1.0		
95	242434076104	MAMMERI	DJOUMANA	8.0		
96	252534006605	MANAA	BELSSAM	0.0		
97	252534080608	MEDJERALLI	SABRINA	1.0		
98	252534065908	MEFTI	AICHA	2.0		
99	252534047602	MEGHAZI	HADJER	0.0		
100	252534021720	MERABTI	RAMI SEYF EDDINE	0.0		
101	252534019901	MERAKHI	KATAR ENNADA			
102	252534076215	MERZOUGUI	INSAF	0.0		
103	252534081915	MESAOUDI	CHOUAIB	0.0		
104	252534043412	MESLEM	GHOUFRANE	0.0		
105	242434079111	MEZRAG	YAKOUB	0.0		
106	212134013239	MOUDJARI	ZINA	7.5		
107	252534036509	MOUERRI	HANA	1.5		
108	252534033615	NEBILI	HADIL	0.0		
109	242434010010	NOUAR	YOUCEF			
110	252534006318	OUREZIFI	ALA	7.5		
111	252534068113	RAFAI	MALEK	1.0		
112	252534043717	RAHALI	ZINEB	0.0		
113	252534048711	RASSOUL	RACHA	6.0		
114	252534043009	REDDAF	RITADJ	2.5		
115	252534068111	REKKAB	MARIEM			
116	252534041317	SAADANE	SARA			
117	252534071818	SAALI	MAROUA	1.0		
118	252534036211	SAIB	AYA			
119	252534048005	SAKER	MALAK AYET			
120	252534017704	SAOU	INES BAHIA			
121	252534080613	SILAT	MEDJEMA	5.0		
122	252535035404	SOLTANI	NIAMA	0.0		
123	252534052606	SOLTANI	YOUNES	1.0		
124	242434048918	SOUDANI	ABDELGHANI	0.0		
125	252534033607	TOBAL	HANI	5.0		
126	252534008415	TOUAM	MOUHAMED	0.0		
127	252534042515	TOULBA	HOUYAM	1.0		
128	252534018709	YAHI	RITADJ	0.0		
129	252534056610	YAHIAOUI	ZAHRAT EL ONS	1.0		
130	252534021712	YAZIDI	IMANE	0.0		
131	252534044612	ZABOUB	SAMI	0.0		
132	252534041020	ZAHAF	RITEDJ	0.0		
133	252534021819	ZDIRA	MANAL	0.0		
134	252534048701	ZEDDOUME	AMINA	0.0		
135	242434048511	ZEGHDAR	SARRA	1.0		
136	252534048803	ZEGHMA	MALAK	0.0		
137	232334020717	ZINAI	NADJI			
138	252534071909	ZINAI	NIAMA	0.0		
139	252534044609	ZOUAGHI	ROUDAINA			
140	252534008606	ZOUAOUI	MOHAMED AMINE	0.0		
141	252534006703	حمودي	جمانة	0.0		
142	252534010310	خاسة	إكرام	0.0		

Solution of the Computer Science 2 Examination

Algorithms and Python Programming

Part I : Fibonacci Sequence Analysis

The Fibonacci sequence is defined by:

$$U_n = U_{n-1} + U_{n-2}$$

with:

$$U_0 = 0, \quad U_1 = 1$$

1. Recursive Implementation

```
def fibonacci(n):
    if n == 0:
        return 0
    elif n == 1:
        return 1
    else:
        return fibonacci(n-1) + fibonacci(n-2)

n = int(input("Enter n: "))
print(fibonacci(n))
```

2. Solving the Complexity Recurrence Using Lists and Loops

The temporal complexity satisfies:

:contentReference[oaicite:0]index=0

We can compute this recurrence iteratively using a list.

```
n = int(input("Enter n: "))

# List for storing T(n)
T = [0] * (n + 1)

# Initial conditions
T[0] = 1
T[1] = 1

# Compute recurrence using loops
for i in range(2, n + 1):
```

$$T[i] = T[i-1] + T[i-2] + 1$$

```
# Display all values
for i in range(n + 1):
    print("T( ", i, ") = ", T[i])
```

Explanation

- The list T stores previously computed values.
- Each new value is computed using:

$$T(i) = T(i-1) + T(i-2) + 1$$

- The loop avoids recursive calls.
- This method is more efficient because each value is computed only once.

3. Iterative Approach

```
def fibonacci_iterative(n):

    if n == 0:
        return 0

    a = 0
    b = 1

    for i in range(2, n + 1):
        c = a + b
        a = b
        b = c

    return b

n = int(input("Enter n: "))
print(fibonacci_iterative(n))
```

4. Complexity Analysis

The iterative version uses a loop executed exactly $n - 1$ times.
 Each iteration performs a constant number of operations.
 Therefore:

$$T(n) = O(n)$$

So, the temporal complexity of the iterative algorithm is linear.

5. Comparison Between Recursive and Iterative Versions

The iterative version is faster.

Reason

- The recursive version recomputes the same Fibonacci values many times.
- Recursive calls create additional memory and function-call overhead.
- The iterative version computes each value only once.

Thus, the iterative algorithm is much more efficient.

6. Estimation for $n = 50$

The recursive Fibonacci algorithm has approximately exponential complexity:

$$T(n) \approx \varphi^n$$

where:

$$\varphi = \frac{1 + \sqrt{5}}{2} \approx 1.618$$

For $n = 50$:

$$\varphi^{50} \approx 2.8 \times 10^{10}$$

Assume the processor executes:

$$2.6 \times 10^9$$

statements per second.

Therefore:

$$\text{Time} \approx \frac{2.8 \times 10^{10}}{2.6 \times 10^9}$$

$$\text{Time} \approx 10.8 \text{ seconds}$$

So the recursive algorithm would take approximately:

11 seconds

7. Optional Mathematical Bonus

The recursive complexity satisfies:

$$T(n) = T(n-1) + T(n-2) + 1$$

Ignoring the constant term:

$$T(n) \approx T(n-1) + T(n-2)$$

The characteristic equation is:

$$x^2 = x + 1$$

or:

$$x^2 - x - 1 = 0$$

The solutions are:

$$x_1 = \frac{1 + \sqrt{5}}{2} = \varphi$$

$$x_2 = \frac{1 - \sqrt{5}}{2}$$

Thus, the closed-form solution is:

$$T(n) = A\varphi^n + B\left(\frac{1 - \sqrt{5}}{2}\right)^n$$

As n becomes large:

$$T(n) = O(\varphi^n)$$

Therefore, the recursive Fibonacci algorithm has exponential complexity.

Part II : Course Questions

The function is defined by:

$$f(x, y) = xy + 2y + x$$

1. Standard Python Function

```
def f(x, y):  
    return x*y + 2*y + x
```

2. Lambda Expression

```
f = lambda x, y: x*y + 2*y + x
```

3. Curried Version Using Lambda

```
f = lambda x: (lambda y: x*y + 2*y + x)
```

Example:

```
g = f(3)
```

```
print(g(4))
```

4. Logic and Syntax

(a)

```
T = [0, True, "hello"]  
T[1] = False
```

This statement is correct because lists are mutable in Python.

(b)

```
T = (0, True, "hello")  
T[1] = False
```

This statement is wrong because tuples are immutable.

Python generates an error:

```
TypeError: 'tuple' object does not support item assignment
```