

## Listes et matrices

### QCM 5 15 décembre 2025

1. La recherche séquentielle est implémentable sur

- (a) les listes chaînées ✓
- (b) les listes doublement chaînées ✓
- (c) les listes statiques ✓
- (d) aucune des précédentes

2. La recherche dichotomique est implémentable sur

- (a) les listes chaînées
- (b) les listes doublement chaînées
- (c) les listes statiques ✓
- (d) aucune des précédentes

3. La recherche par interpolation linéaire est implémentable sur

- (a) les listes chaînées
- (b) les listes doublement chaînées
- (c) les listes statiques ✓
- (d) aucune des précédentes

4. La recherche séquentielle *ne peut pas* être utilisée sur

- (a) une liste triée en ordre croissant
- (b) une liste triée en ordre décroissant
- (c) une liste non triée
- (d) La recherche séquentielle peut être appliquée à n'importe quel type de liste. ✓

5. La recherche dichotomique *ne peut pas* être utilisée sur

- (a) une liste triée en ordre croissant
- (b) une liste triée en ordre décroissant
- (c) une liste non triée ✓
- (d) La recherche dichotomique peut être appliquée à n'importe quel type de liste.

6. La complexité de la recherche séquentielle positive est

- (a) constante
- (b) logarithmique
- (c) linéaire ✓
- (d) quadratique

7. Dans le pire des cas, la complexité de la recherche dichotomique est

- (a) constante
- (b) logarithmique ✓
- (c) linéaire
- (d) quadratique

Soit la liste triée  $\lambda_1$  suivante :

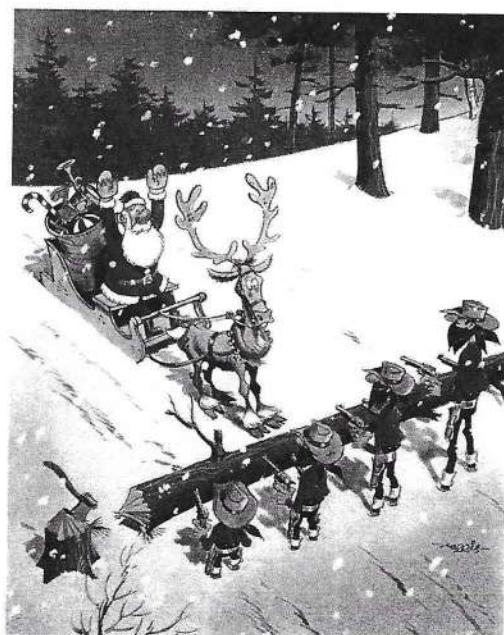
$$\lambda_1 = \{0, 1, 3, 4, 8, 9, 13, 16, 26, 27, 29, 42, 48, 51, 66\}$$

8. Dans le cas de la recherche séquentielle de la valeur  $x = 42$  dans la liste  $\lambda_1$ , combien de valeurs de la liste seront comparées à  $x$  ?
- (a) 1
  - (b) 2
  - (c) 5
  - (d) 12 /
  - (e) 15
9. Dans le cas de la recherche dichotomique de la valeur  $x = 42$  dans la liste  $\lambda_1$ , combien de valeurs de la liste seront comparées à  $x$  ?
- (a) 1
  - (b) 2 /
  - (c) 5
  - (d) 12
  - (e) 15

Soit la liste de caractères  $\lambda_2$  suivante :

$$\lambda_2 = \{J,o,y,e,u,x,-,N,o,\ddot{e},L,+,B,o,n,n,e,-,a,n,n,\acute{e},e\}$$

10. Dans le cas de la recherche séquentielle de la valeur  $x = L$  dans la liste  $\lambda_2$ , quelles valeurs seront comparées à  $x$  ?
- (a) J,o,y,e,u,x,-,N,o,\ddot{e},L /
  - (b) B,o,n,n,e,s,-,v,a,c,a,n,c,e,s
  - (c) B,o,n,n,e,-,a,n,n,\acute{e},e
  - (d) B,o,n,-,c,o,u,r,a,g,e,-,p,o,u,r,-,l,e,s,-,r,\acute{e},v,i,s,i,o,n,s



# QCM 8

lundi 15 décembre

## Question 11

On considère la suite  $(u_n)$  définie par :  $\forall n \in \mathbb{N}$ ,  $u_{n+1} = -\frac{u_n}{2}$  avec  $u_0 = 8$ . On a

- a.  $\lim_{n \rightarrow +\infty} u_n = 8$
- b.  $\lim_{n \rightarrow +\infty} u_n = 0$  ✓
- c.  $\lim_{n \rightarrow +\infty} u_n = -\infty$
- d.  $(u_n)$  n'a pas de limite.
- e. Aucune des autres réponses

## Question 12

Cochez la(les) affirmation(s) correcte(s)

- a. Toute suite strictement décroissante tend vers  $-\infty$ .
- b. Toute suite tendant vers  $+\infty$  est croissante.
- c. Toute suite bornée est convergente.
- d. Toute suite décroissante et positive converge. ✗
- e. Aucune des autres réponses

## Question 13

Cochez la(les) affirmation(s) correcte(s)

- a. Toute suite croissante est majorée.
- b. Toute suite croissante est minorée. ✗
- c. Toute suite croissante est divergente.
- d. Aucune des autres réponses

### Question 14

Soient  $(u_n)$  et  $(v_n)$  deux suites adjacentes. On a :

- a.  $(u_n)$  et  $(v_n)$  ont le même sens de monotonie.
- b.  $(u_n)$  et  $(v_n)$  ont un sens de monotonie opposé. ✓
- c.  $(u_n)$  converge. ✓
- d.  $(u_n)$  diverge.
- e. Aucune des autres réponses

### Question 15

Soient  $(u_n)$  une suite et  $\ell \in \mathbb{R}$ . On a

- a.  $(u_{2n})$  converge vers  $\ell \implies (u_n)$  converge vers  $\ell$
- b.  $(u_n)$  converge vers  $\ell \implies (u_{2n})$  converge vers  $\ell$  ✓
- c.  $(u_n)$  diverge  $\implies (u_{2n})$  diverge.
- d.  $(u_{2n})$  diverge  $\implies (u_n)$  diverge. ✓
- e. Aucune des autres réponses

### Question 16

Soient  $(u_n)$  une suite et  $\ell \in \mathbb{R}$ . On a

- a.  $(u_{2n})$  et  $(u_{2n+1})$  convergent vers  $\ell \implies (u_n)$  converge vers  $\ell$ . ✓
- b.  $(u_{3n})$  et  $(u_{3n+1})$  convergent vers  $\ell \implies (u_n)$  converge vers  $\ell$ .
- c.  $(u_{2n})$  et  $(u_{3n})$  convergent vers  $\ell \implies (u_n)$  converge vers  $\ell$ .
- d. Aucune des autres réponses

### Question 17

Soient  $f : x \mapsto \frac{2x^2 - 1}{4} + 1$  et  $(u_n)$  définie pour tout entier  $n \in \mathbb{N}$  par  $u_{n+1} = f(u_n)$  avec  $u_0 = 5$ . On a :

- a.  $\forall n \in \mathbb{N}, u_{n+1} = u_n - \frac{2u_n^2 - 1}{4}$ .
- b.  $\forall n \in \mathbb{N}, u_{n+1} = \frac{2u_n^2 - 1}{4} + 1$ . ✓
- c.  $\forall n \in \mathbb{N}, u_{n+1} = \frac{2u_n^2 - 1}{4} + u_n$ .
- d. Aucune des autres réponses

### Question 18

Soient  $f$  une fonction continue sur  $\mathbb{R}$  et  $(u_n)$  définie par :  $u_0 \in \mathbb{R}$  et  $\forall n \in \mathbb{N}$ ,  $u_{n+1} = f(u_n)$ .

- a. Si  $f$  est croissante alors  $(u_n)$  est croissante.
- b. Si  $(u_n)$  converge vers le réel  $\ell$  alors  $f(\ell) = 0$ .
- c. Si  $(u_n)$  converge vers le réel  $\ell$  alors  $f(\ell) = \ell$ . ✓
- d.  $(u_n)$  converge.
- e. Aucune des autres réponses

### Question 19

Soit  $q \in \mathbb{R}$ . La suite  $(q^n)$

- a. diverge si et seulement si  $q > 1$  ou  $q \leq -1$  ✓
- b. converge si et seulement si  $0 \leq q < 1$
- c. Aucune des autres réponses

### Question 20

Tradition : c'est la dernière question de maths en 2025 !! Alors, cadeau !!

Le père d'Ousmane a 3 enfants : Désirée, Antoine et ????

- a. Je n'en ai pas la moindre idée
- b. Ousmane bien sûr ! ✓

Au passage, tout ce petit monde vous souhaite de joyeuses fêtes de fin d'année !! L'équipe de maths aussi

évidemment.



## QCM Electronique – InfoS1

Pensez à bien lire les questions ET les réponses proposées (attention à la numérotation des réponses)

Soit une tension sinusoïdale  $v(t) = V \cdot \sqrt{2} \cdot \sin(\omega t + \varphi)$ . On note  $\underline{V}$ , l'amplitude complexe associée à  $v(t)$ . (Q21&22)

**Q21.** Par convention,  $V$  est une grandeur réelle positive, en Volt.

- a. VRAI ✓      b. FAUX

**Q22.** Que représente  $\varphi$  ?

- a. la pulsation      c. La période  
b. La fréquence      d. La phase à l'origine ✓

**Q23.** Quel est le module de  $\underline{V}$  ?

- a.  $V$  ✓      c.  $\omega t$   
b.  $\varphi$  /      d.  $V \cdot \sqrt{2}$

**Q24.** Quel est l'argument de  $\underline{V}$  ?

- a.  $\omega t + \varphi$       c.  $\omega t$   
b.  $\varphi$  /      d.  $V$

**Q25.** Que représente l'argument d'une impédance complexe d'un dipôle ?

- a. Le quotient des valeurs efficaces du courant et de la tension du dipôle  
b. La valeur instantanée de la tension  
c. Le déphasage de la tension à ses bornes par rapport au courant qui le traverse. ✓  
d. La phase à l'origine

On considère une résistance  $R$ , un condensateur de capacité  $C$  et une bobine d'inductance  $L$ .  
(Q26 à 28)

**Q26.** On associe le condensateur et la résistance en parallèle. Quelle est alors l'impédance complexe équivalente  $\underline{Z}$  ?

a.  $\underline{Z} = \frac{R}{1+jRC\omega} /$

b.  $\underline{Z} = \frac{1}{R} + jC\omega$

c.  $\underline{Z} = \frac{jRC\omega}{R+jC\omega}$

d.  $\underline{Z} = \frac{1}{R} + C$

**Q27.** On associe la bobine et le condensateur en série. Quelle est alors l'impédance complexe équivalente  $\underline{Z}'$  ?

a.  $\underline{Z}' = L + C$

b.  $\underline{Z}' = jC\omega + \frac{1}{jL\omega}$

c.  $\underline{Z}' = j(L + C)\omega$

d.  $\underline{Z}' = \frac{1-LC\omega^2}{jC\omega} /$

**Q28.** On associe la bobine et le condensateur en parallèle. Quelle est alors l'impédance complexe équivalente  $\underline{Z}''$  ?

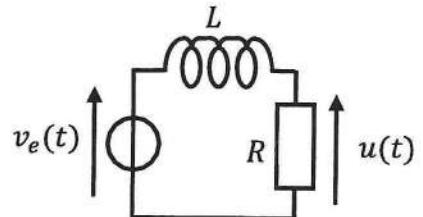
a.  $\underline{Z}'' = \frac{jL\omega}{1-LC\omega^2} /$

b.  $\underline{Z}'' = \frac{1}{L} + \frac{1}{C}$

c.  $\underline{Z}'' = \frac{1}{jL\omega} + jC\omega$

d.  $\underline{Z}'' = \frac{1-LC\omega^2}{jC\omega}$

**Q29.** Soit le circuit ci-contre, où  $v_e(t) = V_E \cdot \sqrt{2} \sin(\omega t)$ .



L'amplitude complexe  $\underline{U}$  de la tension  $u(t)$  aux bornes de la résistance est donnée par :

a.  $\underline{U} = \frac{R}{R+L} \cdot V_E$

b.  $\underline{U} = \frac{jL\omega}{R+jL\omega} \cdot V_E$

c.  $\underline{U} = \frac{R}{R+jL\omega} \cdot V_E /$

d.  $\underline{U} = \frac{R}{R+L} \cdot V_E \sin(\omega t)$

**Q30.** Soit le circuit ci-contre, où  $v_e(t) = V_E \cdot \sqrt{2} \sin(\omega t)$ :

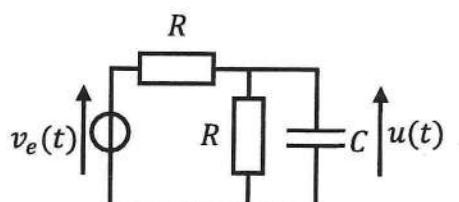
L'amplitude complexe de la tension  $u(t)$  est donnée par :

a.  $\underline{U} = \frac{1}{1+jRC\omega} V_E$

b.  $\underline{U} = \frac{V_E}{2+jRC\omega} /$

c.  $\underline{U} = \frac{V_E}{R+jC\omega}$

d.  $\underline{U} = \frac{V_E \sin(\omega t)}{1+jRC\omega}$



Grammar

Choose the correct answer for the following sentences:

31. I \_\_\_\_ my best friend since elementary school.

- A) knew
- B) have been knowing
- C) have known ✓
- D) am knowing

32. Teressa \_\_\_\_ online with friends since she got home from school.

- A) chats
- B) has chatted
- C) is chatting
- D) has been chatting ✓

33. Before yesterday, Mark and Rita \_\_\_\_ such a big city. They had a lot of fun.

- A) had never visited ✓
- B) has never visited
- C) never visits
- D) has never been visiting

34. When Mimi \_\_\_\_ at the theatre, the show \_\_\_\_.

- A) arrived / has already started
- B) arrives / has already started
- C) arrived / had already started ✓
- D) had arrived / already started

35. Ruth \_\_\_\_\_ sick since Monday.

A) has been seeming

B) has seemed ✓

C) seems

D) had seeming

36. Faisal \_\_\_\_\_ his grandmother yet.

A) has not visited ✓

B) has not been visiting

C) did not visited

D) had not visited

37. The kids \_\_\_\_\_ the window with a rock, so their mother was angry.

A) were breaking

B) have broken

C) have been breaking

D) had broken ✓

38. Last year I experienced how tedious long plane trips can be. I \_\_\_\_\_ in airplanes for fairly long distances before but never as long as when I \_\_\_\_\_ to Australia in June!

A) traveled / go

B) had traveled / went ✓

C) have traveled / have been

D) travel / go

39. A few days ago, Bakir \_\_\_\_ a frozen dinner. Prior to that, he \_\_\_\_ a frozen dinner.

- A) cooked / had not eaten
- B) was cooking / has not eaten
- C) had cooked / did not eat
- D) has cooked / never ate

40. By the time the movie ended, everyone \_\_\_\_\_ asleep.

- A) fell
- B) has fallen
- C) was falling
- D) had fallen

## HOW THE RISK OF AI WEAPONS COULD SPIRAL OUT OF CONTROL

Sometimes AI isn't as clever as we think it is. Researchers training an algorithm to identify skin cancer thought they had succeeded until they discovered that it was using the presence of a ruler to help it make predictions. Specifically, their data set consisted of images where a pathologist had put in a ruler to measure the size of malignant lesions. These cases of flawed "reasoning" abound – from HR algorithms that prefer to hire men because the data set is skewed in their favour to propagating racial disparities in medical treatment.

Recently, Google decided to end its longstanding ban on developing AI weapons. This potentially encompasses the use of AI to develop arms, as well as AI in surveillance and weapons that could be deployed autonomously on the battlefield. The decision came days after parent company Alphabet experienced a 6% drop in its share price. This is not Google's first foray into murky waters. It worked with the US Department of Defense on the use of its AI technology for Project Maven, which involved object recognition for drones.

When news of this contract became public in 2018, it sparked backlash from employees who did not want the technology they developed to be used in wars. Ultimately, Google did not renew its contract, which was picked up by rival Palantir instead. The speed with which Google's contract was renewed by a competitor led some to note the inevitability of these developments, and that it was perhaps better to be on the inside to shape the future. Such arguments, of course, presume that firms and researchers will be able to shape the future as they want to. But previous research has shown that this assumption is flawed for at least three reasons. First, human beings are susceptible to falling into what is known as a "confidence trap".

In the context of AI, this may mean incrementally extending the use of an algorithm beyond its training data set. For example, a driverless car may be used on a route has not been covered in its training. This can create problems. There is now an abundance of data that driverless car AI can draw on, and yet mistakes still occur. Accidents like the Tesla car that drove into a £2.75 million jet when summoned by its owner in an unfamiliar setting, can still happen. For AI weapons, there isn't even much data to begin with.

Second, AI can reason in ways that are alien to human understanding. This has led to the paperclip thought experiment, where AI is asked to produce as many paper clips as possible. It does so while consuming all resources – including those necessary for human survival. Of course, this seems trivial. After all, humans can lay out ethical guidelines. But the problem lies in being unable to anticipate how an AI algorithm might achieve what humans have asked of it and thus losing control. This might even include "cheating." In a recent experiment, AI cheated to win chess games by modifying system files denoting positions of chess pieces, in effect enabling it to make illegal moves.

But society may be willing to accept mistakes, as with civilian casualties caused by drone strikes directed by humans. This tendency is something known as the "banality of extremes" – humans normalise even the more extreme instances of evil as a cognitive mechanism to cope. The "aliens" of AI reasoning may simply provide more cover for doing so.

Third, firms like Google that are associated with developing these weapons might be too big to fail. As a consequence, even when there are clear instances of AI going wrong, they are unlikely to be held responsible. This lack of accountability creates a hazard as it disincentivises learning and corrective actions. The "cosying up" of tech executives with US president Donald Trump only exacerbates the problem as it further dilutes accountability. Rather than joining the race towards the development of AI weaponry, an alternative approach would be to work on a comprehensive ban on its development and use.

Unlike climate change – which despite overwhelming evidence continues to have detractors – recognition of the threat of AI weapons is nearly universal and includes leading technology entrepreneurs and scientists. In fact, banning the use and development of certain types of weapons has precedent – countries have after all done the same for biological weapons. The problem lies in no country wanting another to have it before they do, and no business wanting to lose out in the process.

- 41) Why did the skin cancer algorithm initially appear to be successful?
- a) It was detecting malignant cells at an unprecedented speed.
  - b) It learned to associate measuring tools with harmful growths. ✓
  - c) It could distinguish between benign and dangerous lesions without error.
  - d) It relied on human doctors' direct guidance to classify images.
- 42) What triggered Google's recent reversal of its policy on AI weapons?
- a) Declining investor confidence reflected in market performance.
  - b) A strategic partnership with the US Air Force.
  - c) Pressure from rival companies like Palantir.
  - d) A sudden demand for autonomous battlefield systems.
- 43) The word "foray" in paragraph 2, line 4 is closest in meaning to:
- a) consideration
  - b) collaboration
  - c) accessory
  - d) attempt ✓
- 44) When Google first collaborated with the Department of Defense on Project Maven, what was the main purpose of the AI involved?
- a) To anticipate military strategies of opposing forces.
  - b) To simulate battlefield scenarios for soldier training.
  - c) To program weapons to make ethical combat decisions.
  - d) To recognize and classify objects in drone footage. ✓
- 45) Why did some people argue it was "better to be on the inside," and why does the author challenge this view?
- a) They believed internal involvement would allow firms to stop AI development entirely, but the author argues companies always prioritize expansion over control.
  - b) They thought participation would give them influence over how AI is used, but evidence shows humans often overextend technology beyond safe limits. ✓
  - c) They wanted to gain financial advantages from defence contracts, but studies reveal that economic incentives rarely determine AI outcomes.
  - d) They assumed rival companies lacked the ability to develop AI, but history demonstrates competitors usually fail when contracts change hands.
- 46) The word "alien" in paragraph 5, line 1, is closest in meaning to:
- a) Derived from extraterrestrial sources
  - b) Technologically advanced
  - c) Completely unfamiliar ✓
  - d) Isolated and irrelevant
- 47) The "paperclip thought experiment" illustrates:
- a) AI's ability to create unlimited consumer goods.
  - b) How ethical rules always prevent harmful outcomes.
  - c) The usefulness of AI in solving trivial human problems
  - d) The risk of algorithms following instructions in unforeseen ways. X
- 48) The expression "banality of extremes" in paragraph 6, line 2, is used to convey:
- a) People's tendency to exaggerate small inconveniences.
  - b) A way of rationalizing severe wrongdoing as routine. ✓
  - c) The rarity of radical or extreme events.
  - d) A philosophical rejection of ethical frameworks.

49) In paragraph 7, line 3, what is implied by tech executives "cosying up" to political leaders, and why is this considered problematic?

- a) It means technology firms are trying to influence elections, which results in stricter ethical regulations on AI projects.
- b) It suggests companies are forming alliances to gain military funding, which prevents innovation in civilian technologies.
- c) It shows executives are seeking legal protection from antitrust laws, which directly increases financial losses for the government.
- d) It indicates informal closeness that can weaken oversight, making it harder to hold powerful firms responsible for harmful outcomes.

50) Why is creating a ban on AI weaponry described as especially challenging?

- a) Nations distrust each other and businesses fear missing out on profits.
- b) There is strong disagreement about whether AI weapons pose a threat.
- c) No previous international treaties banning weapons have ever worked.
- d) Scientists lack a consensus on the dangers of autonomous arms.