QCM 18

ALGO
QCM

1. **Quel élément n'est pas dans la signature d'un type abstrait ?**
   (a) Les TYPES
   (b) Les OPERATIONS
   (c) Les PRECONDITIONS

2. **Que représentent opé1 et opé2 dans l'axiome suivant (dans lequel e est un élément et l une liste)** `opé1(opé2 (e,l)) = e` **?**
   (a) opé1 = premier, opé2 = tête
   (b) opé1 = cons, opé2 = premier
   (c) opé1 = premier, opé2 = cons
   (d) opé1 = fin, opé2 = premier

3. **Pour la déclaration**

```
TYPES    true
UTILISE but, incredible
```

   l'opération `thats : incredible x but -> true` **est ?**
   (a) Un observateur
   (b) Une opération interne
   (c) Un rapporteur
   (d) Une opération externe
   (e) Un observeur

4. **Une opération utilisée pour préciser le domaine de définition d'une autre est ?**
   (a) Une opération ponctuelle
   (b) Une opération auxiliaire
   (c) Une opération partielle
   (d) Une précondition

5. **Quelles opérations ne définissent pas une liste récursive ?**
   (a) debut
   (b) longueur
   (c) fin
   (d) cons
   (e) ième

6. **Un type algébrique abstrait doit être ?**
   (a) Complet
   (b) Conséquent
   (c) Consistant
   (d) Complément

7. **Que représentent opé1 et opé2 dans l'axiome suivant (dans lequel e est un élément et l une liste)** `opé1(opé2 (e,l)) = l` **?**
   (a) opé1 = fin, opé2 = tête
   (b) opé1 = cons, opé2 = fin
   (c) opé1 = fin, opé2 = cons
   (d) opé1 = cons, opé2 = tête

8. **Une opération qui n'est pas définie partout est ?**
   (a) Une opération ponctuelle
   (b) Une opération auxiliaire
   (c) Une opération partielle
   (d) Une précondition

9. **La construction d'une liste récursive est basée entre autres sur ?**
   (a) La suppression du $K^{ième}$ élément d'une liste
   (b) La récupération du reste de la liste
   (c) L'insertion d'un élément à la $K^{ième}$ place
   (d) L'ajout d'un élément en tête de liste

10. **Pour la déclaration**

```
TYPES   Vrai, Ouf
UTILISE De, Truc
```

l'opération `c'est-un : Vrai x Truc x De -> Ouf` **est ?**
   (a) Un observateur
   (b) Une opération interne
   (c) Une opération externe
   (d) Un observeur

QCM 8

lundi 18 octobre 2021

Question 11

Dans une urne, il y a 15 boules indiscernables au toucher, numérotées de 1 à 15. On tire 3 boules de l'urne.

a. Si le tirage se fait avec remise, il y a 3^{15} tirages possibles.

b. Si l'on tire simultanément les 3 boules, il y a $\binom{15}{3}$ tirages possibles.

c. Si le tirage se fait successivement et sans remise, il y a $\frac{15!}{3!}$ tirages possibles.

d. Aucune des autres réponses

Question 12

On considère $E = \{a, b, c, d, e\}$. Alors,

a. $\text{Card}(\mathscr{P}(E)) = 16$

b. Le nombre de sous-ensembles à 3 éléments de E est $\binom{5}{3}$.

c. E admet autant de sous-ensembles à 2 éléments que de sous-ensembles à 3 éléments.

d. E admet autant de sous-ensembles à 1 élément que de sous-ensembles à 3 éléments.

e. Aucune des autres réponses

Question 13

Soient a et b deux réels non nuls, et $n \in \mathbb{N}$. On a

a. $(a+b)^n = \sum_{k=1}^{n} \binom{n}{k} a^k b^{n-k}$

b. $(a-b)^n = \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}$

c. $(a+b)^n = \sum_{k=0}^{n} \binom{k}{n} a^k b^{n-k}$

d. $(a+1)^n = \sum_{k=0}^{n} \binom{n}{k} a^k$

e. Aucune des autres réponses

Question 14

Soient A et B deux événements d'un espace probabilisé fini $(\Omega, \mathscr{P}(\Omega), P)$. On a

a. $P(A \cup B) = P(A) + P(B)$

b. $P(A \cap B) = P(A) \times P(B)$

c. $P(\Omega) = 0$

d. $P(A \cup B) = P(A) \cup P(B)$

e. Aucune des autres réponses

Question 15

On lance deux fois de suite un dé équilibré à 6 faces numérotées de 1 à 6. On considère les événements A : « On a obtenu au moins un 3 » et B : « La somme des deux numéros est supérieure ou égale à 9 ». Alors,

a. A et B sont disjoints.

b. $P(A) = 1 - \left(\frac{5}{6}\right)^2$

c. Aucune des autres réponses

Question 16

Soient A et B deux événements de probabilités non nulles d'un espace probabilisé fini $(\Omega, \mathscr{P}(\Omega), P)$. Alors,

a. $P(A \mid B) = \dfrac{P(A \cup B)}{P(A)}$

b. $P(A \mid B) = \dfrac{P(A \cap B)}{P(A)}$

c. $P(A \mid B) = \dfrac{P(A \cup B)}{P(B)}$.

d. $P(A \mid B) = \dfrac{P(A \cap B)}{P(B)}$.

e. Aucune des autres réponses

Question 17

Une urne contient 20 boules rouges numérotées de 1 à 20 et 13 boules blanches numérotées de 1 à 13. On tire une boule au hasard.
On note A : « La boule tirée est rouge », B :« La boule tirée est blanche » et C : « La boule tirée porte un numéro pair ».
On a

a. $P(C) = P(C \cup A) + P(C \cup B)$

b. $C = (C \cup A) \cap (C \cup B)$

c. $C = (C \cap A) + (C \cap B)$

d. $P(C) = P(C \mid A) + P(C \mid B)$

e. Aucune des autres réponses

Question 18

Cochez la(les) bonne(s) réponse(s)

a. Il y a 6! anagrammes possibles du mot « tulipe »

b. Il y a $\frac{7!}{2}$ anagrammes possibles du mot « pivoine »

c. Il y a 60 anagrammes possibles du mot « acacia »

d. Il y a 30 anagrammes possibles du mot « acacia »

e. Aucune des autres réponses

Question 19

$\int_0^1 e^{3x}\,\mathrm{d}x$ est égale à

a. $e^3 - 1$

b. $3e^3 - 3$

c. $\frac{e^3 - 1}{3}$

d. Aucune des autres réponses

Question 20

Considérons $I = \int_1^2 (2x+1)\ln(x)\,\mathrm{d}x$. En intégrant par parties, on obtient

a. $I = [(2x+1)\ln(x)]_1^2 - \int_1^2 \frac{x^2+x}{x}\,\mathrm{d}x$

b. $I = [(2x+1)\ln(x)]_1^2 + \int_1^2 \frac{x^2+x}{x}\,\mathrm{d}x$

c. $I = \left[\frac{2x+1}{x}\right]_1^2 - \int_1^2 (x^2+x)\ln(x)\,\mathrm{d}x$

d. $I = [(x^2+x)\ln(x)]_1^2 - \int_1^2 (x+1)\,\mathrm{d}x$

e. Aucune des autres réponses

MCQ S1 18/10 (Gr1, Gram1)

Graph 1:

21. Which of the following would be the best description of Graph 1?

A. Those who smoke, tend to earn more money.
B. Those who smoke, tend to earn less money.
C. Those who smoke, tend to have better jobs.
D. Those who smoke, tend to have worse jobs.

22. '*Household income*' means:

A. The total amount of money earned by the head of the house.
B. Only the salary of the head of the house.
C. The salaries of the household.
D. The total amount of money earned by the household.

23. Which of the following would be an appropriate title for Graph 1?

A. The risks of smoking during the pandemic.
B. The number of smokers in the USA declines in 2020.
C. The relationship between smoking and household income.
D. The price of cigarettes triple in 2021.

24. How is smoking defined on Graph 1?

A. Smokes "every day" or "some days".
B. Smokes "every day".
C. Smokes "three times a week".
D. Smoke "every other day".

25. What is the name of this type of graph?

A. A bar chart
B. A bubble chart
C. A mind map
D. A line graph

Grammar:

26. I ___ you are going to need help for the move.

a. am supposing
b. suppose
c. supposed
d. was supposing

27. The lady, in the sculpture, _____ amongst the creatures and, impressively, it is made from one solid piece of stone.

a. dances
b. to dance
c. danced
d. is dancing
e. dance

28. At this event, children ____ face-painted whether they are in fancy dress or not.

a. were
b. were being
c. was being
d. is being
e. are being

29. So, if it's 10:00 am in Paris, then it ____ 9:00 am in London and 11:00 am in Moscow, right?

a. is being
b. is
c. was
d. are
e. were

30. In fact, the soup ____ salty.

a. tastes
b. is tasting
c. was tasting
d. has tasted

Why Light Bulbs May Be the Next Hacker Target

By John Markoff, Nov. 3, 2016

SAN FRANCISCO — The so-called Internet of Things, its proponents argue, offers many benefits: energy efficiency, technology so convenient it can anticipate what you want, even reduced congestion on the roads.

Now here's the bad news: Putting a bunch of wirelessly connected devices in one area could prove irresistible to hackers. And it could allow them to spread malicious code through the air, like a flu virus on an airplane.

Researchers report in a paper to be made public on Thursday that they have uncovered a flaw in a wireless technology that is often included in smart home devices like lights, switches, locks, thermostats and many of the components of the much-ballyhooed "smart home" of the future.

The researchers focused on the Philips Hue smart light bulb and found that the wireless flaw could allow hackers to take control of the light bulbs, according to researchers at the Weizmann Institute of Science near Tel Aviv and Dalhousie University in Halifax, Canada.

That may not sound like a big deal. But imagine thousands or even hundreds of thousands of internet-connected devices in close proximity. Malware created by hackers could be spread like a pathogen among the devices by compromising just one of them.

And they wouldn't have to have direct access to the devices to infect them: The researchers were able to spread infection in a network inside a building by driving a car 229 feet away.

Just two weeks ago, hackers briefly denied access to whole chunks of the internet by creating a flood of traffic that overwhelmed the servers of a New Hampshire company called Dyn, which helps manage key components of the internet.

Security experts say they believe the hackers found the horsepower necessary for their attack by taking control of a range of internet-connected devices, but the hackers did not use the method detailed in the report being made public Thursday. One Chinese wireless camera manufacturer said weak passwords on some of its products were partly to blame for the attack.

Though it was not the first time hackers used the Internet of Things to power an attack, the scale of the effort against Dyn was a revelation to people who didn't realize that having internet-connected things knitted into daily life would come with new risks.

"Even the best internet defense technologies would not stop such an attack," said Adi Shamir, a widely respected cryptographer who helped pioneer modern encryption methods and is one of the authors of the report.

The new risk comes from a little-known radio protocol called ZigBee. Created in the 1990s, ZigBee is a wireless standard widely used in home consumer devices. While it is supposed to be secure, it hasn't been held up to the scrutiny of other security methods used around the internet.

The researchers found that the ZigBee standard can be used to create a so-called computer worm to spread malicious software among internet-connected devices.

Computer worms, which can keep replicating from one device to another, get less attention these days, but in the early years of the commercial internet, they were a menace. In 1988, one worm by some estimates brought down a tenth of the computers connected to the internet.

Since then, the number of internet-connected devices has spiraled into the billions, and with it the risks of a cleverly created worm.

So what could hackers do with the compromised devices? For one, they could create programs that help in attacks like the one that hit Dyn. Or they could be a springboard to steal information, or just send spam.

They could also set an LED light into a strobe pattern that could trigger epileptic seizures or just make people very uncomfortable. It may sound far-fetched, but that possibility has already been proved by the researchers.

The color and brightness of the Philips Hue smart light bulb can be controlled from a computer or a smartphone. The researchers showed that by compromising a single light bulb, it was possible to infect a large number of nearby lights within minutes. The worm program carried a malicious payload to each light — even if they were not part of the same private network.

In creating a model of the infection process, they simulated the distribution of the lights in Paris over an area of about 40 square miles and noted that the attack would potentially spread when as few as 15,000 devices were in place over that area.

The researcher said they had notified Philips of the potential **vulnerability** and the company had asked the researchers not to go public with the research paper until it had been corrected. Philips fixed the vulnerability in a patch issued on Oct. 4 and recommended that customers install it through a smartphone application. **Still, it played down the significance of the problem**.

"We have assessed the security impact as low given that specialist hardware, unpublished software and close proximity to Philips Hue lights are required to perform a theoretical attack," Beth Brenner, a Philips spokeswoman, said in an emailed statement.

To perfect their attack, the researchers said they needed to overcome two separate technical challenges. They first found a "major bug" in the way the wireless communications system for the lights had been executed, which made it possible to "yank" already installed lamps from their existing networks.

The researchers then used what cryptographers describe as a "side channel" attack to purloin the key that Philips uses to authenticate new software. The term side channel refers to the clever use of information about how a particular encryption scheme is used.

"We used only readily available equipment costing a few hundred dollars, and managed to find this key without seeing any actual updates," the researchers wrote. "This demonstrates once again how difficult it is to get security right even for a large company that uses standard cryptographic techniques to protect a major product."

31) What is the "Internet of Things"?
- a) A platform to buy and sell goods online
- b) A network of connected devices and other physical objects that can communicate together
- c) All the equipment (routers, modems, network cables) between the ISP and a user location
- d) A book by George Orwell

32) Which of these statements is NOT true?
- a) Hackers could introduce malicious code into wireless devices in homes and offices
- b) Hackers need physical access to devices in order to infect them
- c) There is a wireless flaw in certain light bulbs
- d) Strong passwords would probably not have prevented the attack on Dyn

33) What does the article state about worms? **(Check all that apply)**
- a) They can copy themselves to clean devices
- b) They had largely been forgotten about nowadays
- c) ZigBee is a good example of one
- d) Dyn was attacked by one

34) According to the article, what can hackers do when they have control of a smart device?
- a) They can cause it to operate in a way to affect people with certain illnesses
- b) They can use it to access bank accounts
- c) They can take control of an entire city
- d) They can cause electrical devices to overheat and catch fire

35) **"Still, it played down the significance of the problem"**. What is this referring to?
- a) The experiment with the lights in Paris
- b) The ramifications of a product recall
- c) The smartphone application that had been hacked
- d) Philips' reluctance to admit the importance of the vulnerability

36) What did the researchers explain about the method used by hackers to perfect their attack? **(Choose two answers)**
- a) It was a very sophisticated attack that only the best experts would be able to carry out
- b) The hackers stole the encryption key using relatively cheap and accessible hardware
- c) The hackers knew how to get lamps from other networks to participate in the attack
- d) It can be used in big companies who encrypt their communications

37) What is NOT an advantage of smart devices, according to the information provided in the article?
- a) They reduce electricity consumption
- b) They make less noise
- c) They make it quicker to drive distances
- d) They can get to know your personal preferences

38) What were two consequences of the attack on Dyn? **(Choose two answers)**
- a) Websites became inaccessible
- b) The buildings were flooded
- c) Their servers became overloaded
- d) Sensitive information was stolen

39) Which word has the closest meaning to "**vulnerability**" as used in the article?
- a) A failure
- b) A fissure
- c) A flaw
- d) A flop

40) A "compromised" device is **most significantly** one that:
- a) Works less well than it normally should
- b) Has been "yanked" from another network
- c) Presents a danger to people who use it
- d) Is no longer under the owner's control

QCM Physique/Electronique – InfoS1

Pensez à bien lire les questions ET les réponses proposées

(Q41 à Q44)
Soit un point matériel M repéré par son vecteur position exprimé dans la base cartésienne$(\vec{u}_x, \vec{u}_y, \vec{u}_z)$:

$$\overrightarrow{OM} = x(t)\vec{u}_x + y(t)\vec{u}_y + z(t)\vec{u}_z = \begin{pmatrix} x(t) \\ y(t) \\ z(t) \end{pmatrix}_{(\vec{u}_x,\vec{u}_y,\vec{u}_z)}$$

Q41. Déterminer quelle expression correspond au vecteur vitesse associé en coordonnées cartésiennes :

- a. $v(t) = \sqrt{x(t)^2 + y(t)^2 + z(t)^2}$
- b. $\vec{v}(t) = \dot{x}(t)\vec{u}_x + \dot{y}(t)\vec{u}_y + \dot{z}(t)\vec{u}_z$
- c. $\vec{v}(t) = \sqrt{\dot{x}(t)^2 + \dot{y}(t)^2 + \dot{z}(t)^2}$
- d. $\vec{v}(t) = \frac{d^2}{dt^2}\overrightarrow{OM}(t)$

Q42. Déterminer quelle expression correspond à la vitesse instantanée :

- a. $v(t) = \sqrt{x(t)^2 + y(t)^2 + z(t)^2}$
- b. $\vec{v}(t) = \dot{x}(t)\vec{u}_x + \dot{y}(t)\vec{u}_y + \dot{z}(t)\vec{u}_z$
- c. $v(t) = \sqrt{\dot{x}(t)^2 + \dot{y}(t)^2 + \dot{z}(t)^2}$
- d. $\vec{v}(t) = \frac{d}{dt}\overrightarrow{OM}(t)$

Q43. Déterminer quelle expression correspond à l'accélération instantanée associée :

- a. $\vec{a}(t) = \begin{pmatrix} \ddot{x}(t) \\ \ddot{y}(t) \\ \ddot{z}(t) \end{pmatrix}_{(\vec{u}_x,\vec{u}_y,\vec{u}_z)}$
- b. $a(t) = \sqrt{\ddot{x}(t)^2 + \ddot{y}(t)^2 + \ddot{z}(t)^2}$
- c. $a(t) = \frac{dx(t)}{dt}\vec{u}_x + \frac{dy(t)}{dt}\vec{u}_y + \frac{dz(t)}{dt}\vec{u}_z$
- d. $\vec{a}(t) = \frac{d^2}{dt^2}\overrightarrow{OM}(t)$

Q44. Déterminer quelle expression correspond au vecteur accélération en coordonnées cartésiennes :

- a. $\vec{a}(t) = \begin{pmatrix} \ddot{x}(t) \\ \ddot{y}(t) \\ \ddot{z}(t) \end{pmatrix}_{(\vec{u}_x,\vec{u}_y,\vec{u}_z)}$
- b. $a(t) = \sqrt{\ddot{x}(t)^2 + \ddot{y}(t)^2 + \ddot{z}(t)^2}$
- c. $a(t) = \frac{dx(t)}{dt}\vec{u}_x + \frac{dy(t)}{dt}\vec{u}_y + \frac{dz(t)}{dt}\vec{u}_z$
- d. $\vec{a}(t) = \frac{d}{dt}\overrightarrow{OM}(t)$

Q45. Soit un point M repéré dans une base cartésienne par les équations horaires suivantes :

$$x(t) = 2t; y(t) = -t^2 + 2t; z(t) = 0$$

Déterminer quelle expression représente l'équation de la trajectoire du point M :

a. $y(x) = \frac{-x^2}{2} + x$ b. $y(x) = \frac{-x^2}{4} + \frac{x}{2}$

c. $y(x) = \frac{-x^2}{2} + 2x$ d. $y(x) = \frac{-x^2}{4} + x$

Q46. Pour mesurer la tension aux bornes d'un générateur, on met le voltmètre :

a. En série avant le générateur

b. En série après le générateur

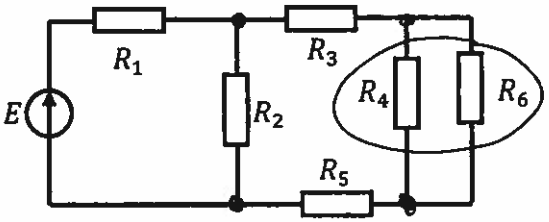
c. En parallèle avec le générateur

d. On ne peut pas mesurer la tension aux bornes d'un générateur

Q47. Une maille d'un circuit correspond à un ensemble de dipôles placés en série.

a. VRAI b. FAUX

Soit le circuit suivant :



Q48. Ce circuit comprend

a. 5 nœuds, 5 branches et 2 mailles

b. 4 nœuds, 3 branches et 3 mailles

c. 4 nœuds, 6 branches et 6 mailles

d. 5 nœuds, 4 branches et 3 mailles

Q49. Si $R_1 = R_2 = R_3 = R_4 = R_5 = R_6 = R$, quelle est l'expression de la résistance équivalente vue par E ?

a. $6R$ b- $\frac{7}{13}.R$ c- $\frac{12}{7}.R$ d. $\frac{7}{12.R}$

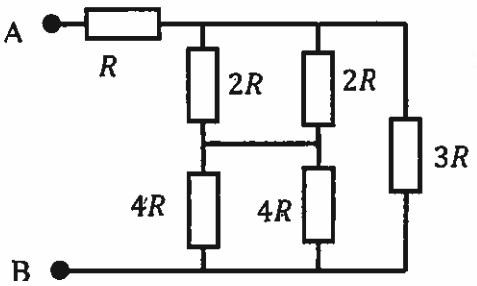
Q50. Quelle est la résistance vue entre A et B ?

a. $\frac{5}{2}R$

b. $16R$

c. $\frac{3}{5}.R$

d. $\frac{2}{5}R$



$2R$

$\frac{4R^2}{2} = 2R^2$

$8R^2$

$10R^2$

$R_t \quad \frac{10R^2 \times 3R}{10R^2 + 3R} = \frac{30R^3}{10R^2+3R} \quad \frac{30R^4}{10R^2+3R}$

=

QCM 2
Architecture des ordinateurs

Lundi 18 octobre 2021

11. Dans quelle base est représenté le nombre suivant : 111191111 ?
    - A. Base 5
    - B. Base 1
    - C. Base 42
    - D. Base 9

12. Quel est le poids du chiffre 7 dans le nombre suivant : 4915827312_{10} ?
    - A. 4
    - B. 1000
    - C. 7000
    - D. 3

13. Quel nombre est égal à 100_{10} ?
    - A. 142_8
    - B. Aucune de ces réponses.
    - C. 1204_4
    - D. 66_{16}

14. Quel est le résultat de la soustraction suivante : $5000_{15} - 1_{15}$?
    - A. $4FFF_{15}$
    - B. $4EEE_{15}$
    - C. Aucune de ces réponses.
    - D. 4999_{15}

15. 256 Gio =
    - A. 2^{35} bits
    - B. 2^{38} bits
    - C. 2^{41} octets
    - D. 2^{41} bits

16. 525_8 =
    - A. 340_{10}
    - B. 341_{10}
    - C. 342_{10}
    - D. Aucune de ces réponses.

17. $10AE_{16}$ =
    - A. $4\,267_{10}$
    - B. $4\,268_{10}$
    - C. $4\,269_{10}$
    - D. Aucune de ces réponses.

18. 5260_{10} =
    - A. 1010010001110_2
    - B. 1010010001101_2
    - C. 1010010001111_2
    - D. Aucune de ces réponses.

4096 + 1024 + 128 + 8 + 4 =
5120
5248
5256
5260

19. 1001110001100111_2 =
    - A. $2718F_{16}$
    - B. $9C632_{16}$
    - C. 270615_8
    - D. Aucune de ces réponses.

1111
2^3+2^2+2+1
$8+4+2+1$
15

20. 7777_8 =
    - A. 1111111111111_2
    - B. FFF_{15}
    - C. 777_{16}
    - D. Aucune de ces réponses.