

**Faculty of Science
Final Examination**

**Computer Science COMP-102A
*Computers and Computing***

Examiner: Prof. Claude Crépeau
Associate Examiner: Prof. Joëlle Pineau

Date: Dec. 5, 2013
Time: 18:00 – 21:00

INSTRUCTIONS:

This examination is worth 40% of your final grade.

The total of all questions is 105 points.

Each question is assigned a value found in brackets next to it.

OPEN • BOOKS • / • OPEN • NOTES

Faculty standard calculator permitted only.

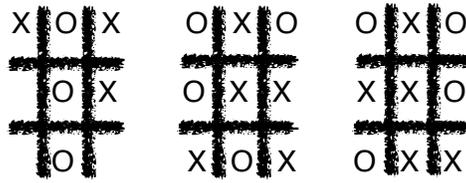
This examination consists of 4 pages including title page.

This examination consists of 12 questions.

**Suggestion : read all the
questions and their values before
you start.**

[12%]

1) Explain why the 3 following tic-tac-toe configurations are qualified as **terminal** :



(A) (B) (C)

For each of the 3 configurations above say whether their **utilities** are -1,0,1 and explain why.

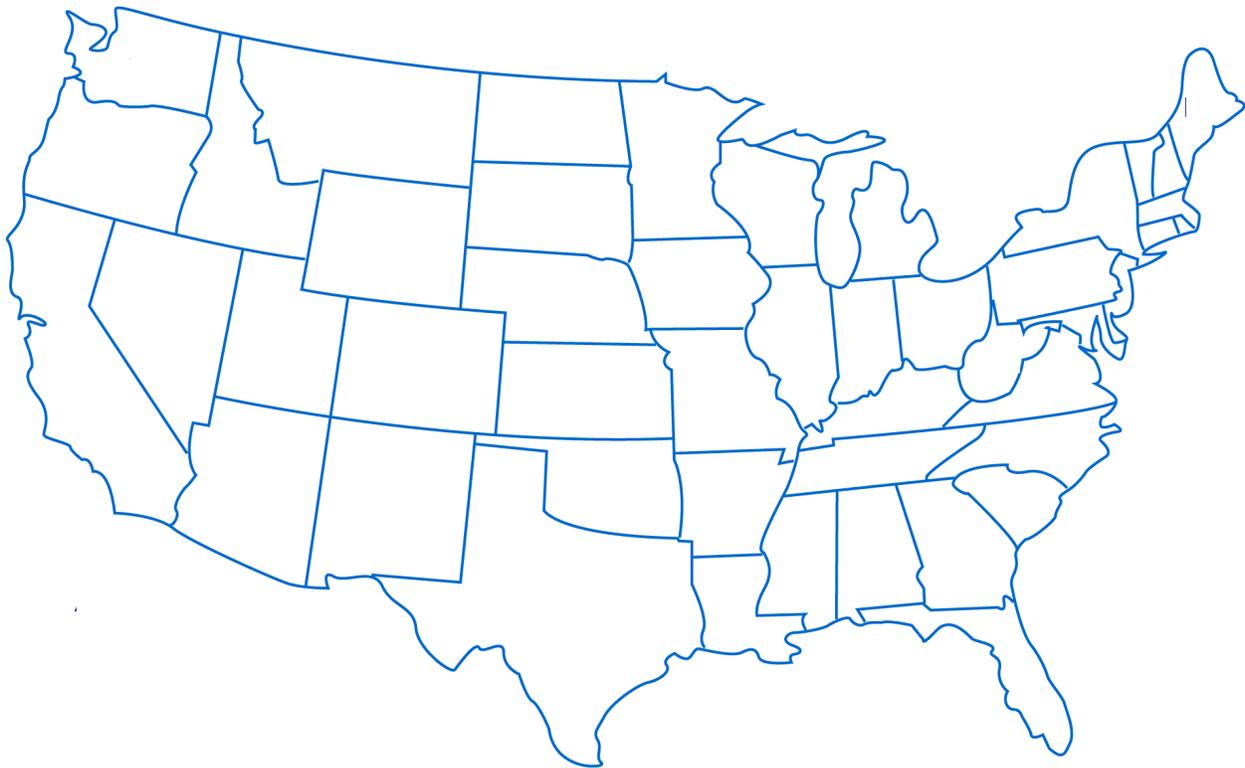
[9%]

2) Explain whether the map of the USA is

- 1-colorable ?
- 2-colorable ?
- 3-colorable ?
- 4-colorable ?

[+5%] bonus

- 3-colorable ?
- 4-colorable ?



[15%]

3) Remember this quote from **Seymour Cray** used by prof. Kry :

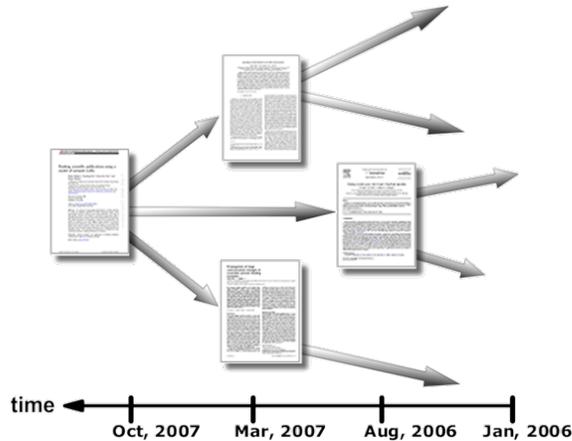
“If you were plowing a field, which would you rather use: Two strong oxen or 1024 chickens?”

Explain what this quote has to do with computer science !

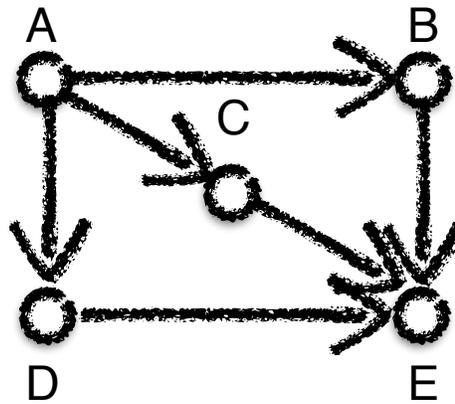
[9%] 4) Explain the 3 different types of **mutations** and provide an example for each.

[8%] 5) Explain what are **effectors** and **actuators** and provide an example of each.

[5%] 6) Explain why the **citation network** is an example of a "conceptual network".



[12%] 7) Consider the following graph and provide its adjacency matrix.



[8%] 8) Rewrite the following function using **recursion** instead of **iteration** :

```
function exp(n){
    m=1;
    for (var i=1; i<=n; i++){ m=2*m };
    return( m )
}
```

[8%] 9) Explain why current identification systems based on entering a PIN code to authorize monetary operations is not very secure...

