5 group task in discrete math:

Edited at 11pm 24.7.2017.

Answer the questions in your own words. Do NOT copy.

Graph theory:

1. Is Hamiltonian cycle possible on the Kongsberg Bridges? Why?

2. Explain the Four Color Theorem.

https://en.wikipedia.org/wiki/Four\_color\_theorem

3. Solve the Chinese postman problem.

https://en.wikipedia.org/wiki/Route\_inspection\_problem

Planarity of graphs:

4. Check graphs planarity using the necessary conditions of planarity.

https://en.wikipedia.org/wiki/Planar\_graph

5. What is a Dual graph?

https://en.wikipedia.org/wiki/Dual\_graph

Topology:

6. Explain the Topology.

https://en.wikipedia.org/wiki/Topology

FFT:

7. Explain the Fast Fourier Transform.

https://en.wikipedia.org/wiki/Fast\_Fourier\_transform

Chaos in cryptography:

8. We can generate chaos using mod function, fractals, irrational numbers, dice, coin, and many physical objects. This is used for the encryption in cryptography. Cryptography is all about generations a perfect chaos.

Is it true?

If true then what else can we use to generate chaos?

If false then why and what are the better ways?

Pattern recognition in cryptanalysis:

9. We can recognize patterns using the algebra in the classical cases and statistics in more complicated and more modern cases. This is used for the decryption and hacking in cryptanalysis. Cryptanalysis is all about pattern recognition.

Is it true?

If true then what else can we use to recognize patterns?

If false then why and what are the better ways?

Cryptanalysis:

10. How could the hacking be prevented?

Analyze the famous hacking cases.

https://en.wikipedia.org/wiki/2016\_United\_States\_election\_interference\_by\_Russia

http://edition.cnn.com/2016/12/12/politics/russian-hack-donald-trump-2016-election/

https://en.wikipedia.org/wiki/Venona\_project

http://www.foxnews.com/tech/2012/10/10/world-war-ii-encryption-for-your-e-mail.html

Hash function:

11. Calculate the hash function for your group number.

http://www.fileformat.info/tool/hash.htm

12. How can we inverse a hash function?

Complexity of algorithms:

13. Give the computational complexity of all the algorithms.

We did it in class.

14. Give computational complexity for Euclid, Dijkstra, Prim, Kruskal, Traveling Salesman, tree traversal algorithms.

15. Explain Petersen graph.

https://en.wikipedia.org/wiki/Petersen\_graph

16. What is Dirac theorem for graphs?

17. Explain Ore theorem for graphs.

Chemistry graph theory:

18. How is graph theory used in chemistry?

Deadline: 31.7.2017.