5 group task in discrete math:

Edited at 4pm 16.1.2018.

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

6. Explain the Topology.

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

6.2. Explain the Fast Fourier Transform.

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

7. Find the graceful labeling of $K\_{11,12}$

9. Color the map of the country number 100 using as few colors as possible.

http://www.worldometers.info/geography/alphabetical-list-of-countries/

10. Find the number of regions for the graph with 30 edges and 20 vertices.

10.2. 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?

10.3. 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?

10.4. 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

11. Calculate the hash function for your group number.

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

12. How can we inverse a hash function?

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.

18. How is graph theory used in chemistry?

Deadline: January 2018.