INM370 – Advanced Databases
Tutorial 9 – NoSQL Databases/CAP Theorem

Question 1. What do the following terms refer to in the context of distributed (database) systems: *scale up* and *scale out*?

Question 2. Name four motivating factors for database designers and other IT professionals to develop and use NoSQL databases.

Question 3. What do C and A stand for in CAP "theorem"? Give an example of how designing for one of those properties can lead to difficulties in maintaining the other.

Question 4. What does E in the BASE acronym stands for? What does that term refer to?

Question 5. Describe monotonic write consistency. Explain why it is so important.

Question 6. How many values can be stored with a single key in a key-value NoSQL database?

Question 7. What is a *namespace* in the context of key-value NoSQL databases? Why is it important?

Question 8. How do document databases differ from key-value databases?

Question 9. Describe two differences between document databases and relational databases.

Question 10. Name two data structures used in column family databases

Question 11. What are the two fundamental data structures in a graph database?

Question 12. You are assigned a task of building a database to model employees and whom they work with. The database must be capable of answering queries such as "How many employees does Employee A work with?", "Does Employee A work with anyone who works with Employee B", etc.
Which type of NoSQL database would naturally fit these requirements? Justify your answer.

Question 13. Dropbox enables *immediate consistency* via synchronization in some cases. However, what happens in case of a network partition? One can do a simple experiment:

- Open a file in your Dropbox
- Disable your network connection (e.g., WiFi, 4G/5G)
- Try to edit the file in the Dropbox: can you do that?
- Re-enable your network connection: what happens to your Dropbox folder?

What happens in this case? Discuss your answer.