1-In the context of 2's complement representation, explain how overflow can occur during binary addition, and describe a method to detect such an overflow condition?

2-Explain how a high-level loop structure and conditional statements (if, while, for) are translated into assembly language and then into machine code, using the concept of labels and branch instructions.
Write the assembly code for a simple program that adds 1 to A if A = B, and subtracts 1 from A if A ≠ B?

3-Based on the idea of little man computer (LMC). Explain how it can subtract two numbers? Clarify your answer by explaining the full process of fetch and execute cycle.
Hint: write assembly code for subtraction

4-How does the bus architecture in computer organization help different components communicate efficiently, and what problems might occur if multiple devices try to use the bus at the same time?

5-**Brainstorming plays a significant role in technology innovation.**

a. What does brainstorming mean?
b. List and briefly explain each rule of brainstorming.
c. In your own words, provide a real-world example to explain how each rule helps a team working within a company.

6-**Big Data is generated from a variety of digital sources.**

1. Identify one potential source of Big Data that you have encountered in your personal life or in the industry you work in (e.g., manufacturing, real estate, marketing, or financial services), which has not yet been fully utilized.
2. Explain at least one of the three Vs of Big Data (Volume, Velocity, or Variety) that characterizes this data source.
3. Discuss how it could be used, and suggest possible applications or use cases that would create value.

7-**Scenario:** A hospital installs connected medical devices such as heart monitors, glucose sensors, and remote patient tracking systems that continuously send real-time health data to doctors for proactive diagnosis. To ensure instant alerts and reliable communication, the hospital plans to upgrade its network to 5G technology.

1. Identify the IoT subcategory (application area) used in this scenario and explain how it is beneficial to healthcare operations. (1 point)
2. Describe how 5G enhances the performance of such IoT systems compared to traditional networks. (1 point)

8-What are the two types of encryptions? Define each one.