1. Define in your own words:

   - **Intelligence:** Dictionary definition of Intelligence talk about “the capacity to acquire and apply knowledge” or “the faculty of thought and reason” or “the ability to comprehend and profit from experience”.
   - The ability to apply knowledge in order to perform better in an environment.

   - **Artificial Intelligence:** The study and construction of agent programs that performs well in a given environment, for a given agent architecture.

   - **Agent:** An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through actuators, or it is a computer program that is expected to act rationally toward its environment.

   - **Rationality:** What is rational at any given time depends on four things:
     - The performance measure that defines the criterion of success.
     - The agent’s prior knowledge of the environment.
     - The actions that the agent can perform.
     - The agent’s percept sequence to date.

   - **Logical reasoning:** The mechanical aspect of rationality.

2. To what extent are the following computer systems instances of artificial intelligence:

   - **Super market barcode scanners:**
   - The problem of reading a bar code is an extremely limited and artificial form of visual interpretation, and it has been carefully designed to be as simple as possible, given the hardware.

   - **Web search Engines:**
   - Search engines like google.com, which group the retrieved pages into categories, use clustering techniques.
   - Likewise, other functionalities provided by a search engines use intelligent techniques; for instance, the spelling corrector uses a form of data mining based on observing users' corrections of their own spelling errors.
   - On the other hand, the problem of indexing billions of web pages in a way that allows retrieval in seconds is a problem in database design, not in artificial intelligence.

   - **Voice-activated telephone menus:**
   - To a limited extent. Such menus tends to use vocabularies which are very limited -e.g. the digits, "Yes", and "No" —and within the designers' control, which greatly simplifies the problem.
   - On the other hand, the programs must deal with an uncontrolled space of all kinds of voices and accents. The voice activated directory assistance programs used by telephone companies, which must deal with a large and changing vocabulary are certainly AI programs.

- **Internet routing algorithms that respond dynamically to the state of the network**:
- This is border line. There is something to be said for viewing these as intelligent agents working in cyberspace. The task is sophisticated, the information available is partial, the techniques are heuristic (not guaranteed optimal), and the state of the world is dynamic. All of these are characteristic of intelligent activities.
- On the other hand, the task is very far from those normally carried out in human cognition.

3. **Why would evolution tend to result in systems that act rationally? What goals are such systems designed to achieve?**

- Evolution tends to result in systems that act rationally because it decreases the chance of the system dying or something irreparable occurring to it.
- The goals of these systems are to survive and grow.

4. **Is AI a science, or is it engineering? Or neither or both? Explain.**

- AI is both science and engineering. Observing and experimenting, which are at the core of any science, allows us to study artificial intelligence. From what we learn by observation and experimentation, we are able to engineer new systems that encompass what we learn and that may even be capable of learning themselves.