Artificial Intelligence Assignment 1

Instructions: Answer all the following questions critically. Each response should be well-structured, analytical, and demonstrate clear understanding of the concepts discussed in class. Avoid using examples directly from lecture slides; instead, apply your reasoning to new contexts.

Word limit for each question: 250–300 words. To be submitted after T1 (on 12th Sep 2025 at 5 PM)

1. The study of AI draws from multiple allied disciplines such as philosophy, mathematics, psychology, and brain science. Critically evaluate how interdisciplinary integration strengthens AI research, and discuss potential risks of over-reliance on a single discipline’s perspective.
2. A rational agent is expected to maximize its performance measure given percepts and prior knowledge. Critically examine the limitations of defining rationality in real-world AI systems where environments are partially observable, stochastic, and dynamic.
3. First-Order Logic introduces quantifiers, predicates, and functions to represent knowledge. Critically analyze the strengths and weaknesses of First-Order Logic as a representation scheme for AI, particularly in handling uncertainty, incomplete information, and dynamic changes.
4. Search techniques, rule-based reasoning, and inference procedures are central to AI problem solving. Critically compare the expressive power and computational feasibility of these approaches, and argue which should be prioritized in designing scalable AI systems.
5. Learning agents adapt from experience, whereas knowledge-based systems rely on pre-encoded rules. Critically evaluate the balance between adaptability and explainability in the future development of AI, considering ethical, technical, and societal implications.