2018 EE4014 TEST 1

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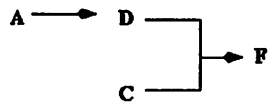
Q1 What is the main difference between the early days A.I. (e.g. expert system) and modern days A.I. (e.g. Google's Alpha Go)? (20 marks)

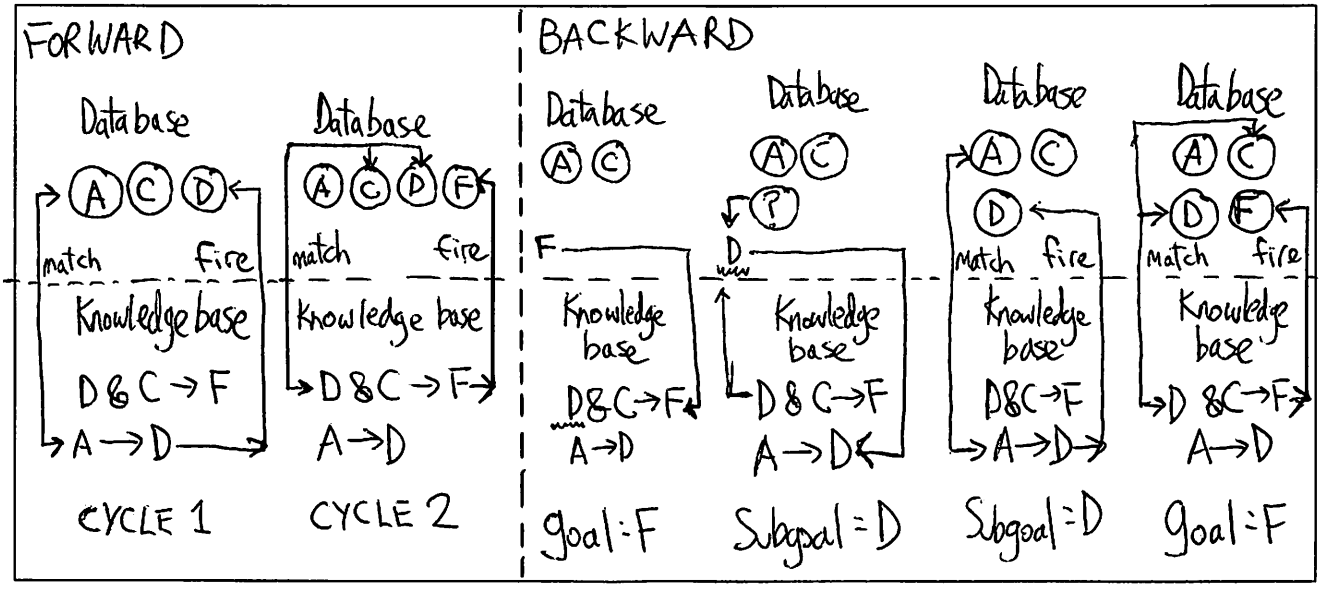
	early days AI	modern days AI
Obtain Knowledge:	From specified experts	From the internet or big data
Self improvement:	No	Yes, via machine learning
Target Problem:	Narrow specific problem	General wider scope problem

Q2 Use FORWARD CHAINING and BACKWARD CHAINING to show the following reasoning deduction: (20 marks)



Rule 1: D & C → F
Rule 2: A → D

Database
A C



Q3 Comparing Bayesian Reasoning Method and Certainty Factors Method, what advantages does each method have over the other? (20 marks)

Bayesian Reasoning Advantages	1. More suitable for complex reasoning. Based on mathematics 2. More accurate if reliable data exists 3. More scientific, based on statistics
Certainty Factors Advantages	1. More simple approach, based on human grading 2. Useful when no reliable data exists 3. Useful when the problem cannot be represented by statistic means.

Q4 Use Madani-style fuzzy inference to perform:

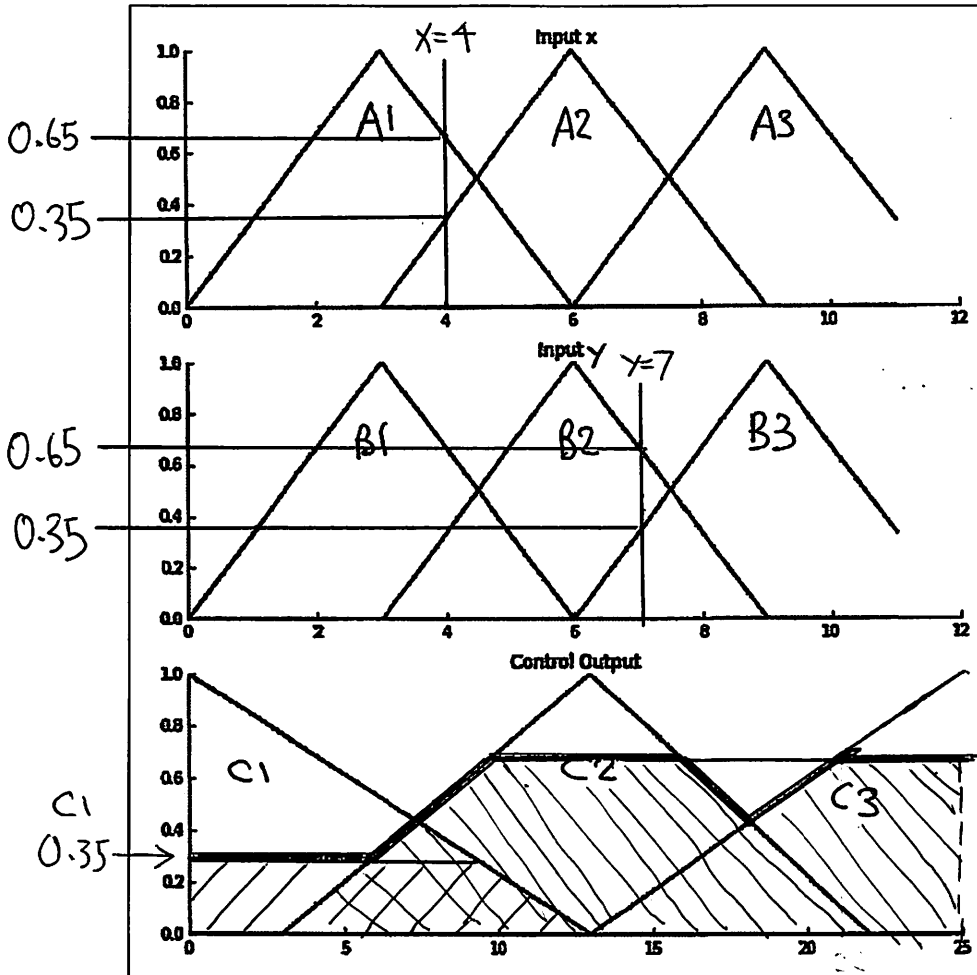
(i) **Fuzzification** from crisp inputs: input x=4; input y=7 (10 marks)

(ii) **Rules Evaluation** Rule 1: IF x is A1 AND y is B3, THEN z is C1; (10 marks)
Rule 2: IF x is A2 OR y is B2, THEN z is C2, z is C3

(iii) **Aggregation of Rule Consequences** (10 marks)

(iv) **Defuzzification**, and find the crisp output value (10 marks)

You may put your answer on the graph



$\mu(x=A_1) = 0.65$

$\mu(x=A_2) = 0.35$

$\mu(y=B_2) = 0.65$

$\mu(y=B_3) = 0.35$

If x is A1 AND y is B3 THEN z is C1 min 0.35

If x is A2 OR y is B2 THEN z is C2, z is C3 } max 0.65

Find the C.O.G :

$$C.O.G. = \frac{\sum_{x=a}^{b} \mu_A(x)\, x}{\sum_{x=a}^{b} \mu_A(x)} = 14 \text{ (approx)}$$

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