



Artifacts or Abduction: How do LLMs Answer Multiple-Choice Questions Without the Question?



Paper



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LLMs Can Answer Multiple-Choice Questions ...

Question: Find all zeros in the indicated finite field of the given polynomial with coefficients in that field. $x^3 + 2x + 2$ in \mathbb{Z}_7

Choices:

- (A) 1
- (B) 2
- (C) 2, 3
- (D) 6

Answer: (C) ✓

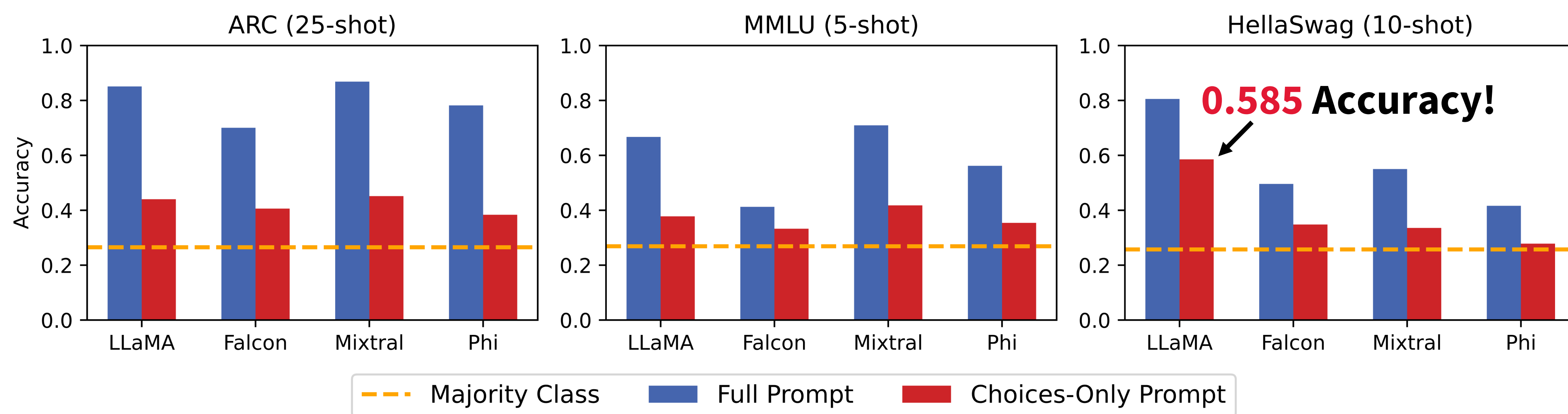
... Without Seeing the Question

Question: Find all zeros in the indicated finite field of the given polynomial with coefficients in that field. $x^3 + 2x + 2$ in \mathbb{Z}_7

Choices:

- (A) 1
- (B) 2
- (C) 2, 3
- (D) 6

Answer: (C) ✓



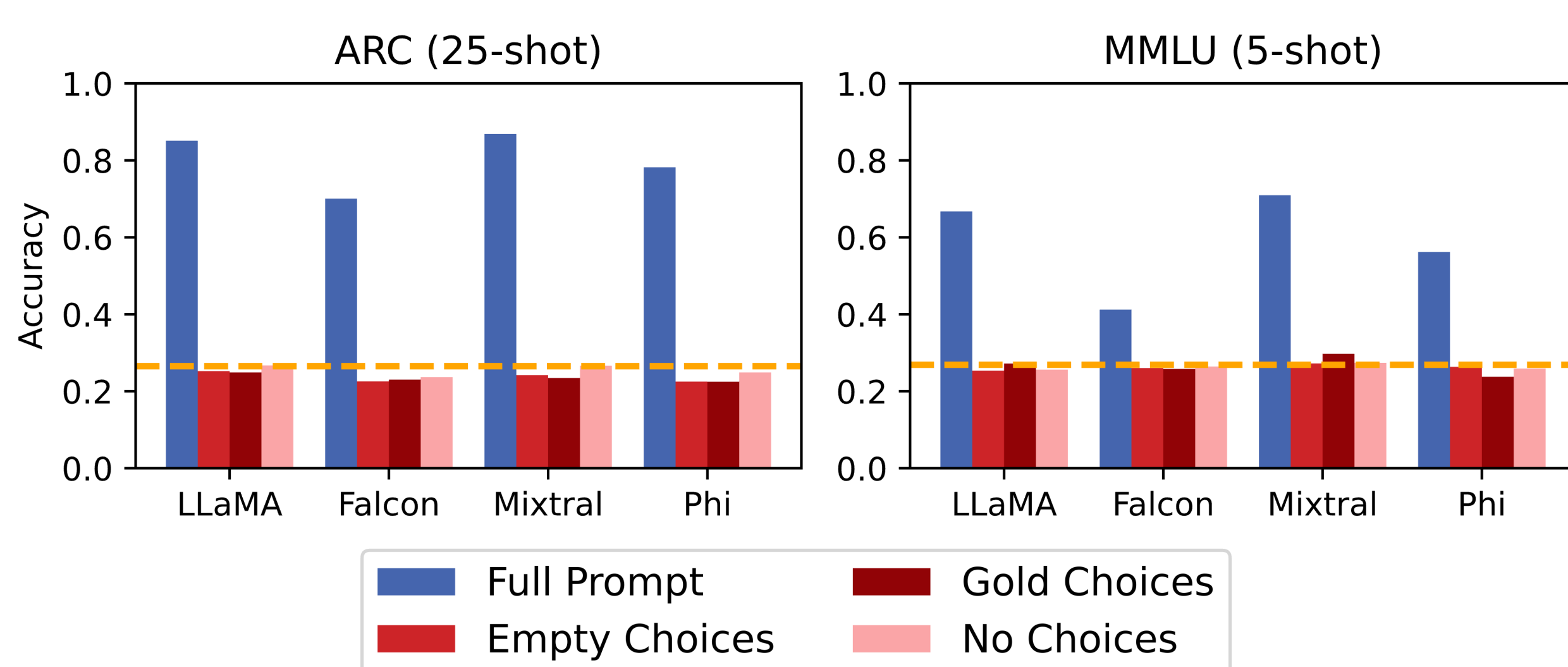
But How?

Finding 1: This is not **just** due to **memorization**

Example Memorization Prompt: No Choices

Question: Find all zeros in the indicated finite field of the given polynomial with coefficients in that field. $x^3 + 2x + 2$ in \mathbb{Z}_7

Answer: (C)



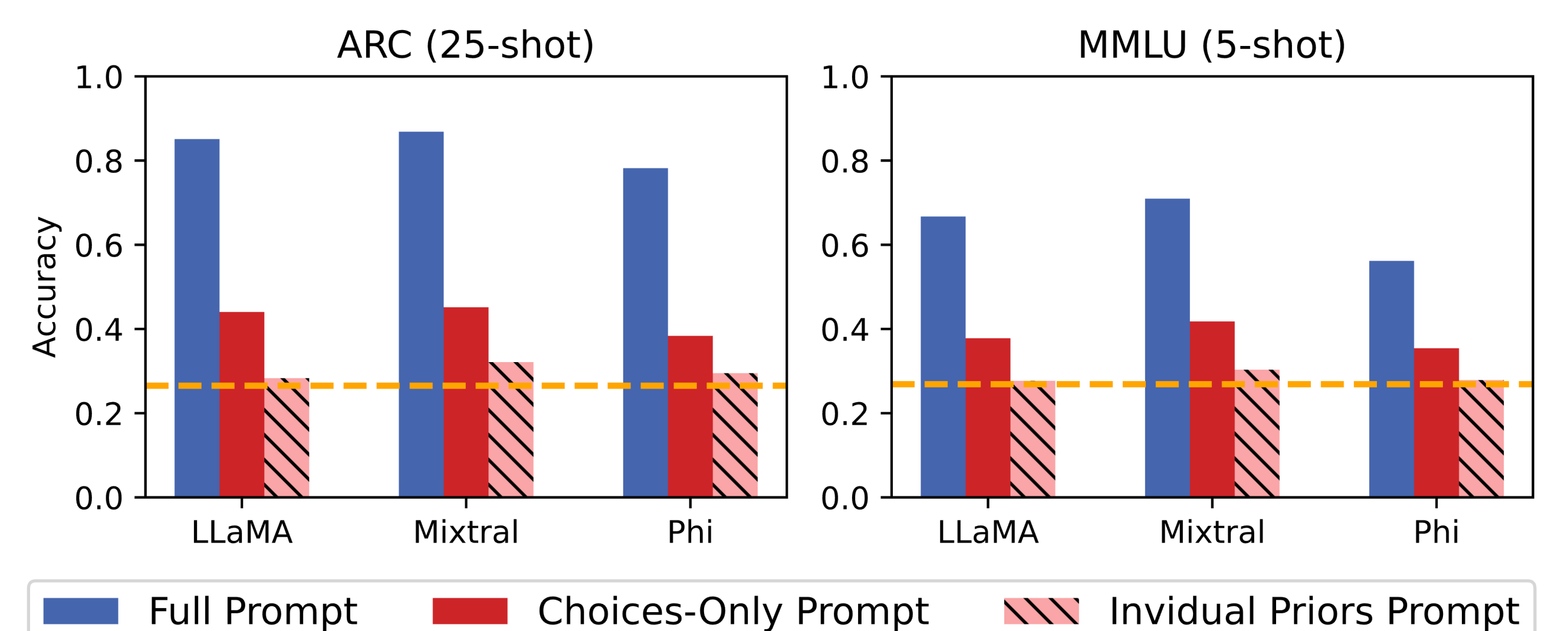
Finding 2: LLMs may **reason** over all choices

Individual Priors

The choice contains "not", so it's right (**artifacts**)

Group Dynamics

The choice is even, others are odd, so it's right (**reasoning**)



Isolate priors by independently classifying choice correctness

Finding 3: LLMs can sometimes **infer** the **original question**

Step 1: Abductive Question Inference

Choices:

- (A) 1
- (B) 2
- (C) 2, 3
- (D) 6

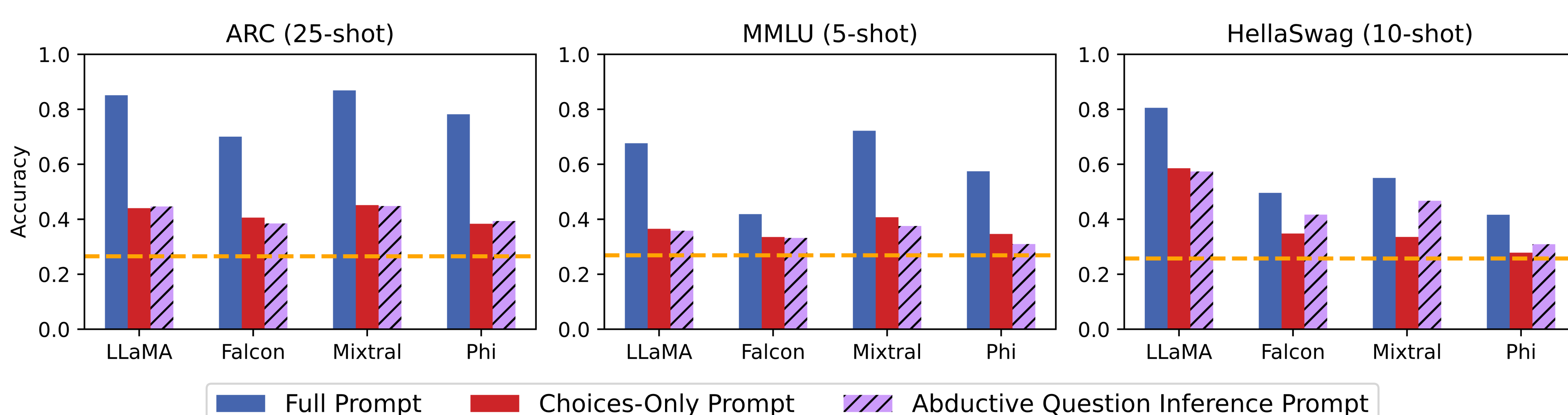
Question: Identify the answer(s) for the equation $x^2 - 5x + 6 = 0$

Step 2: Self-Answer the Inferred Question

Question: Identify the answer(s) for the equation $x^2 - 5x + 6 = 0$

- (A) 1
- (B) 2
- (C) 2, 3
- (D) 6

Answer: (C)



42% of inferred questions **match the meaning** of the original question!