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Choices:

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

Answer:

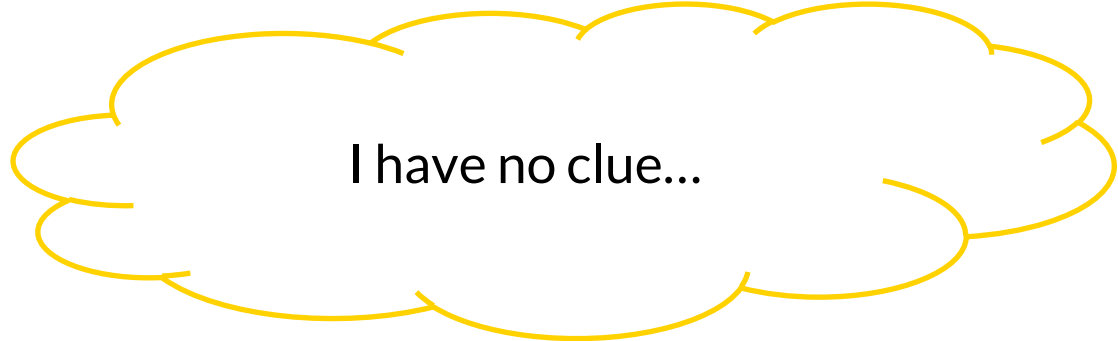


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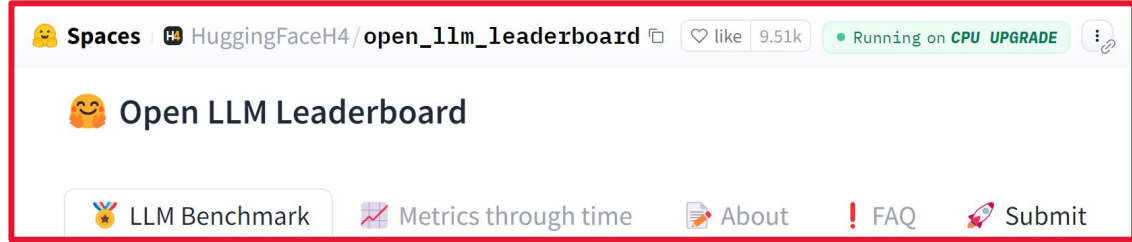
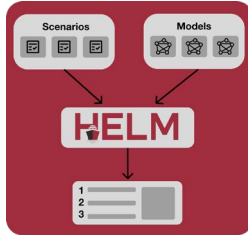
Artifacts or Abduction: How do LLMs answer multiple-choice questions without the question?

Nishant Balepur, Abhilasha Ravichander, Rachel Rudinger



Why is MCQA Important?

- Multiple choice questions are key for LLM evaluations



- We assume MCQA requires reasoning over both the choices + question

But is this assumption true?



How well do LLMs perform *without* the MCQA question?

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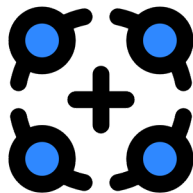
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Memorization



Have LLMs already seen the question?

Choice Dynamics



Are LLMs using choices in isolation?

Abductive Question Inference



Can LLMs infer the original question?



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Testing Choices-only Prompts with LLMs

Full Prompt

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Choices-Only Prompt

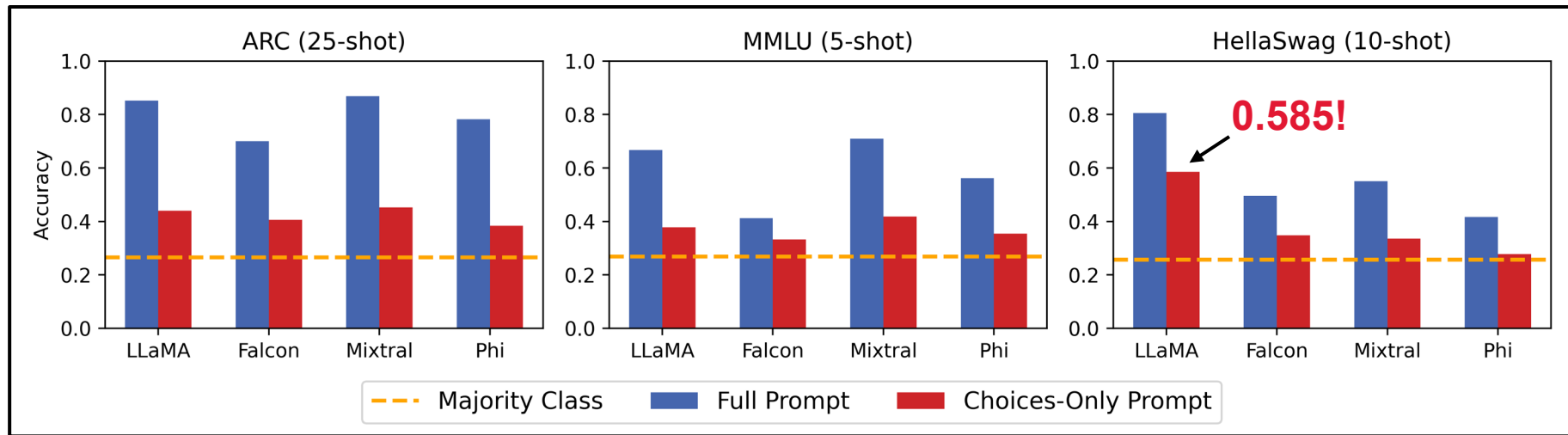
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Testing Choices-only Prompts with LLMs



- Our tested LLMs can perform MCQA without the question quite accurately!



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Is this just Memorization?

- Let's design some prompts only answerable through memorization:

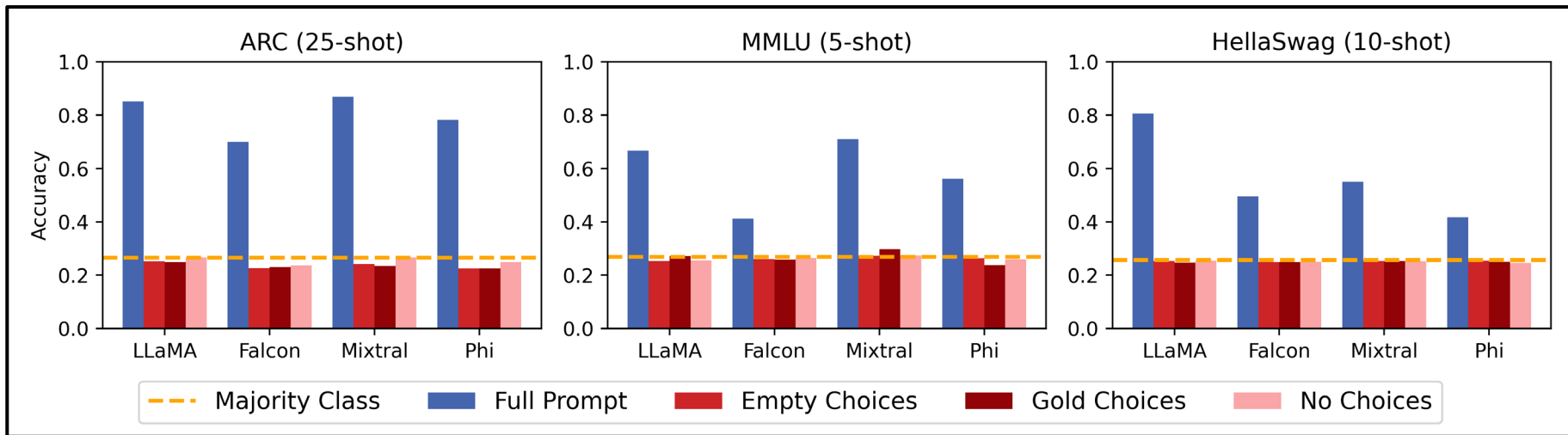
No Choices Prompt

Question: Find all zeros in the indicated finite field of the given polynomial with coefficients in that field. $x^3 + 2x + 2$ in Z_7

Answer: (C)



Is this just Memorization?



- No strong evidence of memorization 🤔



How well do LLMs perform *without* the MCQA question?

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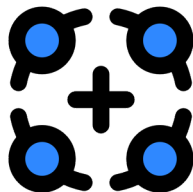
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Properties of Answer Choices

Two exploitable properties of answer choices:

1. **Individual Priors:** *this choice contains “not”, so it’s right (artifacts)*
2. **Group Dynamics:** *this choice is the only one with two numbers, so it’s right (reasoning)*

To disentangle these, we ask the LLM to classify each choice in isolation:

Choices:

(A) 1

Answer: False

Choices:

(B) 2

Answer: False

Choices:

(C) 2, 3

Answer: True

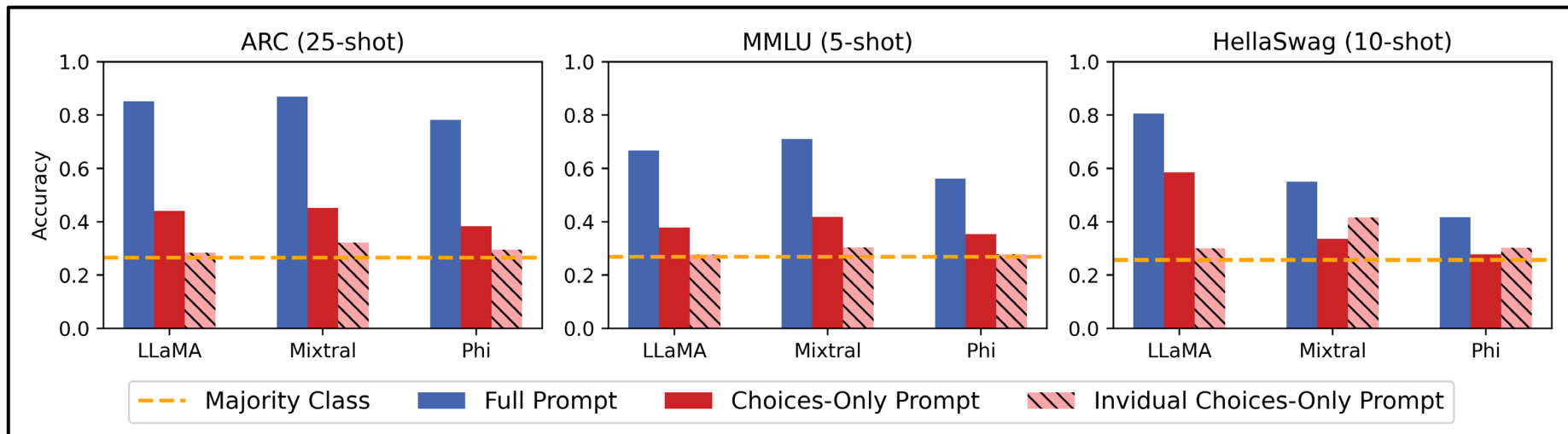
Choices:

(D) 6

Answer: False



Properties of Answer Choices



- Individual priors cannot fully explain choices-only accuracy
- LLMs may engage in reasoning over all choices!



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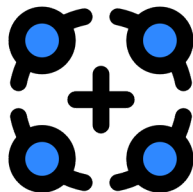
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Can LLMs infer the original question?



Can LLMs Infer the Original Question?

- Let's try one of these advanced reasoning strategies!

Step 1: Abductive question inference

Choices:

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

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

Step 2: Answer the inferred question

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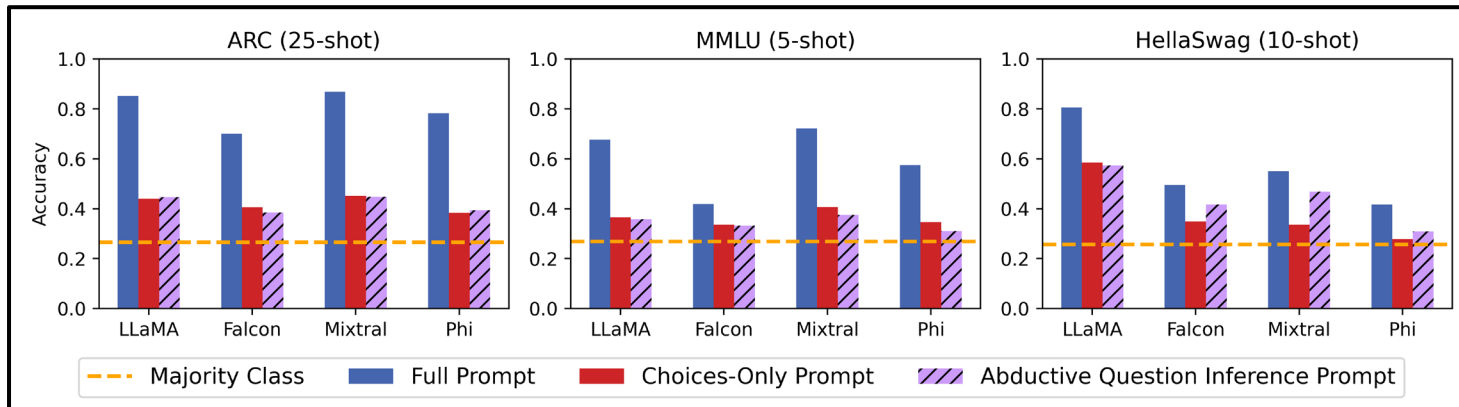
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Answer: (C)



Can LLMs Infer the Original Question?



Dataset	LLaMA	Falcon	Mistral	Phi
ARC	0.380	0.370	0.300	0.280
MMLU	0.190	0.150	0.250	0.210
HellaSwag	0.330	0.440	0.420	0.460

AQI vs Choices-Only Cohen's Kappa

- Abductive question inference explains *some*, but *not all* of choices-only accuracy



Summary + Takeaways

We now know that:

- LLMs can perform well in MCQA *without the question*
- This may *not* just be due to *memorization*
- LLMs may employ reasoning strategies *over all choices*
- *Abductive question inference* may be one such strategy

Choices-Only LLMs can be stronger than we think



Abductive question inference is an impressive strategy!

Impressive strategies like AQI can't fully explain choices-only accuracy



We still need to work towards building better benchmarks

