## **Current Achievements**

### ✅Confirmed the **usability** with **Open AI GPT-4.**

Using the following, purposely suboptimal image to test the recognising of the to-be “math-blocks”.



Along with the following prompt:

“You are a math assistant game for a highly gifted child that is learning the correct notation for math. For all following images, If the expression in the image is correct, only respond with a checkmark. If it is incorrect, provide a few correct options for what he might have meant by correcting either the expression or the outcome. Provide your correction as: Did you mean: - correct option 1 - correct option 2 Etc.”

Generated the following output:

*The notation in the image appears incorrect. The summation symbol (∑) is used instead of an integral symbol (∫), which is the proper notation for continuous integration. Additionally, the result of the integral seems to be miscalculated.*

*Did you mean:*

* *∫02x2 dx=83\int\_0^2 x^2 \,dx = \frac{8}{3}*
* *∑x=02x2\sum\_{x=0}^{2} x^2 (if summation was intended, but this does not equal 83\frac{8}{3})*

*Would you like to clarify whether you meant an integral or a summation?*

–

Proving the usability of AI to correct possible notation errors in Arnes math.

### ✅ Successfully installed and configured **Ollama** to run the **Mistral AI model locally**.

An app using GPT-4 requires paying for the API and assuming no one wants to spend money\* on the project for now, a local, open source AI was set-up.

### ✅ Verified that Mistral can process **math-related queries** through direct input.

Asking the same question as to GPT-4 in text format, yielded the following response:

*The given expression has an incorrect use of the summation sign, as it should not be used in this context for a definite integral.*

*To compute the integral of `x^2` from 0 to 2, we can simply find the anti-derivative and then evaluate it at the limits of integration:*

*The antiderivative of `x²` is `(1/3)x³`.*

*Evaluating the antiderivative at the upper limit (2), we get:*

*`(1/3)(2)³ = (1/3)(8) = 5/3`*

*Evaluating the antiderivative at the lower limit (0), we get:*

*`(1/3)(0)³ = 0`*

*Finally, we subtract the value of the antiderivative at the lower limit from the value at the upper limit:*

*`∫(0)^(2) x² dx = (5/3) - 0 = 5/3`.*

*Did you mean...*

*1. A Riemann sum with step size `h=1`, where the limits of integration are `0` and `2`, and a function `f(x)=x^2`:*

*`Σ\_{k=0}^{n-1} f((k+1)h) \* h = (0)² + (1)² + (2)² + ... + (n-1)²`.*

*In this case, `n=3`, as the step size is `h=1` and we want to reach 2. So `Σ\_{k=0}^{n-1} f((k+1)h) \* h = 0^2 + 1^2*

*+ 2^2 = 1 + 4 = 5`.*

*2. A definite integral with limits of integration from `0` to `a`, where `a` is a constant greater than or equal to 2:*

*∫(0)^(a) x² dx = (1/3)(x³)|₀^(a) - (1/3)(x³)|₀ = (1/3)((a)³ - 0) - (1/3)(0) = (1/3)(a³) = (5/3) if `a=2`.*

*In this case, you can choose any value greater than or equal to 2 for `a` and the result will be the same.*

-> However slower and less polite right now, with proper prompt engineering in the API, I think we can make this model handle math for **free!**

## **Next Steps**

🔹 Set up a **backend** to handle image uploads.
🔹 Implement some **OCR** to extract math expressions from images.
🔹 Develop an intuitive **(mobile) app** for image uploads.
🔹 Connect the **backend to Mistral AI** for math validation.