Symbol Testing

Example

Evaluate the definite integral:

$$\int_0^1 x^2\,dx = \left[\frac{x^3}{3}\right]_0^1 = \frac{1}{3}$$

Key Idea

In general, for any positive integer n,

$$\int_0^1 x^n\,dx = \frac{1}{n+1}$$

Example

Test of summation symbols:

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6} \quad \text{and} \quad \sum_{k=0}^{10} k = \frac{10 \cdot 11}{2} = 55$$

Silly Trick

To remember the Gaussian sum trick:

$$\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$$

Gauss thought of summing pairs: $1+n$, $2+(n-1)$, etc.

Example

Limit identities:

$$\lim_{x \to 0} \frac{\sin x}{x} = 1 \quad \text{and} \quad \lim_{x \to \infty} \frac{1}{x} = 0$$

Key Idea

You can use epsilon-delta definitions to prove limits rigorously.

More Tests

Example

Testing square roots and inline math:
Inline: The square root of 2 is $\sqrt{2} \approx 1.41$
Display:

$$\sqrt{x^2 + 1} = \sqrt{25} = 5$$

Example

Math sets and Greek letters:

$$x \in \mathbb{R}, \quad \alpha + \beta = \theta, \quad \phi^2 = 1$$

Example

Aligned equations:

$$\begin{aligned} f(x) &= x^2 + 2x + 1 \\ &= (x + 1)^2 \end{aligned}$$

Key Idea

Use `aligned` inside `equation` or `display math` for multi-line math.

Silly Trick

Remember: πr^2 is not pie are square, it's **area**! Pie are round