

Test Document 2: Mathematical Equations

Mathematics Test

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1 Introduction to Mathematics

This document tests various mathematical typesetting capabilities.

2 Equations

2.1 Inline and Display Equations

The quadratic formula is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2} \tag{1}$$

2.2 Matrix Operations

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \tag{2}$$

3 Theorems and Proofs

Theorem 1 (Pythagorean Theorem). In a right triangle, $a^2 + b^2 = c^2$ where c is the hypotenuse.

Definition 1. A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself.

4 Complex Equations

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \tag{3}$$

$$\nabla \times \vec{B} = \mu_0 \vec{J} + \mu_0 \epsilon_0 \frac{\partial \vec{E}}{\partial t} \tag{4}$$