

# Document with Complex Mathematical Equations

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## 1 Complex Mathematical Equations

This document demonstrates a series of complex mathematical equations, including integrals, matrices, and fractions.

### 1.1 Integral Example

An example of a complex integral:

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi} \quad (1)$$

### 1.2 Matrix Example

An example of a matrix:

$$\mathbf{A} = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \quad (2)$$

### 1.3 Fraction and Square Root Example

An example of fractions and square roots:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (3)$$

### 1.4 Summation and Product Example

An example of a summation and a product:

$$\sum_{i=1}^n i = \frac{n(n+1)}{2}, \quad \prod_{i=1}^n i = n! \quad (4)$$