

수식 표현 실습 Part I

권현우

서강대학교 수학과 / KTUG

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수식의 종류

- ▶ 행중 수식(inline style) $\int_a^b f(x) dx$
- ▶ 별행 수식(display style)

$$\int_a^b f(x) dx$$

$$\int_a^b f(x) dx$$

(1)

```
$\int_a^b f(x) dx$
```

```
\[ \int_a^b f(x) dx \]  
\begin{equation}  
\int_a^b f(x) dx  
\end{equation}
```

숫자 쓰기

$-5, 9, 0.666, \sqrt{2}, \pi, \sqrt[3]{-32}, i$

$-5, 9, 0.666, \sqrt{2}, \pi, \sqrt[3]{-32}, i$

```
\documentclass{article}
```

```
\begin{document}
```

```
$-5, 9, 0.666, \sqrt{2}, \pi, \sqrt[3]{-32}, i$
```

```
\[ -5, 9, 0.666, \sqrt{2}, \pi, \sqrt[3]{-32}, i \]
```

```
\end{document}
```

연산

더하기, 빼기, 곱하기, 나누기

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

$$(a + b) \times (c + d) = a \times c + a \times d + b \times c + b \times d$$

$$a \div b = q \quad \cdots r$$

```
\[
```

```
(a+b)^2 = a^2 + 2ab + b^2
```

```
\]
```

```
\[
```

```
(a-b)^2 = a^2 - 2ab + b^2
```

```
\]
```

```
\[
```

```
(a+b)\times (c+d) = a\times c + a\times d + b\times c + b\times d
```

```
\]
```

```
\[
```

```
a \div b = q \quad \quad \cdots r
```

```
\]
```

연산

분수, 지수, 제곱근

$$\frac{355}{113}, a^{n+1}, 2^{2^{2^2}} \quad \sqrt{2}, \sqrt[3]{2}, \sqrt{\sqrt{\sqrt{2}}}$$
$$2 + \frac{1}{2 + \frac{1}{3 + \frac{1}{2}}}$$

```
\[  
\frac{355}{113}, \quad a^{\{n+1\}}, 2^{\{2^{\{2^2\}}\}} \quad \sqrt{2}, \sqrt[3]{2},  
\rightarrow \sqrt{\sqrt{\sqrt{2}}}  
\]  
\[  
2 + \cfrac{1}{2 + \cfrac{1}{3 + \cfrac{1}{2}}}  
\]
```

연산

괄호

$$10 \div [\{ 5 \times (2 + 3) \} - 20]$$
$$\left[\frac{\pi}{2}, \infty \right)$$

```
\[  
10 \div \left[ \left\{ 5 \times \left( 2+3 \right) \right\} - 20 \right]  
\]  
\[  
\left[\frac{\pi}{2}, \infty\right)  
\]
```

집합 기호

$\mathbb{N}, \mathbb{Z}, \mathbb{R}$

$x \in \mathbb{R} \setminus \{0\}, \quad \emptyset, \varnothing$

```
\usepackage{amssymb}
```

```
...
```

```
\[
```

```
\mathbb{N}, \mathbb{Z}, \mathbb{R}
```

```
\]
```

```
\[
```

```
x \in \mathbb{R} \setminus \{0\}, \quad \varnothing, \emptyset
```

```
\]
```

위첨자와 아래첨자 그리고 underbrace

$$a^m a^n = a^{m+n}$$

$$a_{n+1} = a_n + d$$

$$a^n = \underbrace{a \times a \times \cdots \times a}_n$$

`$a^m a^n = a^{m+n}$`

`$a_{n+1} = a_n + d$`

`$a^n = \underbrace{a \times a \times \cdots \times a}_n$`

위첨자와 괄호

$$(f^{-1} \circ g^{-1}) (1)$$

```
\[  
\left( f^{-1} \circ g^{-1} \right) (1)  
\]
```

수식환경

$$\begin{aligned}\frac{12a^3b^{-4}}{4a^2b} &= \frac{12a^3 \cdot a^2}{4b \cdot b^4} \\ &= \frac{3a^4}{b^5}\end{aligned}$$

```
\[  
\begin{aligned}  
\frac{12 a^3 b^{-4}}{4a^2 b} &= \frac{12 a^3 \cdot a^2}{4b \cdot b^4} \\ &= \frac{3a^4}{b^5}  
\end{aligned}  
\]
```

cases 환경과 brace

$$|a| = \begin{cases} a, & a \geq 0 \\ -a, & a < 0. \end{cases}$$

$$\begin{cases} ax + by = p \\ cx + dy = q \end{cases}$$

```
\[  
\left\vert a\right\vert = \begin{cases}  
  a, & a \ge 0 \\  
 -a, & a < 0 .  
\end{cases}
```

```
\]
```

```
\[  
\left\  
\begin{aligned}  
& ax + by = p \\  
& cx + dy = q  
\end{aligned} \right.
```

```
\]
```

수식환경

$$ax^2 + bx + c = 0 \quad (a \neq 0)$$

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

```
\usepackage{mathtools,amssymb} %mathtools: amsmath 확장판
```

```
...
```

```
\[  
\begin{aligned}  
&ax^2 + bx + c = 0 \quad \text{\: \: (a \neq 0) \ \\  
&x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}  
\end{aligned}  
\]
```

▶ align, aligned, alignedat, ...

수식환경

$$ax^2 + bx + c = 0 \quad (a \neq 0)$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

수식환경에서 띄어쓰기를 하려면

`\`, `\:`, `\quad`, `\qquad`, `\hspace{길이단위}`

지수함수와 로그함수

$$\log_a b = \frac{\log_c b}{\log_c a}$$

$$\ln x = -\frac{1}{2}$$

$$e^{\ln x} = e^{-1/2}$$

```
\[  
\log_a b = \frac{\log_c b}{\log_c a}  
\]  
  
\[  
\begin{aligned}  
\ln x &= -\frac{1}{2} \\ e^{\ln x} &= e^{-1/2}  
\end{aligned}  
\]
```

삼각함수

$$\begin{aligned}\sin x &= \sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1} x^{2n+1} \\ &= x - \frac{x^3}{3!} + \frac{x^5}{5!} + \cdots\end{aligned}$$

```
\[  
\begin{split}  
\sin x &= \sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1} x^{2n+1} \\ &= x - \frac{x^3}{3!} + \frac{x^5}{5!} + \cdots  
\end{split}  
\]
```

벡터기호와 노름

$$\|\overrightarrow{PQ}\| = \sqrt{(a-x)^2 + (b-y)^2}$$

$$\mathbf{w}_1 = \text{proj}_{\mathbf{v}} \mathbf{u} = \left(\frac{\mathbf{u} \cdot \mathbf{v}}{\|\mathbf{v}\|^2} \right) \mathbf{v}$$

```
\[  
\| \overrightarrow{PQ} \| = \sqrt{(a-x)^2+(b-y)^2}  
\]  
  
\[  
\mathbf{w}_1 = \operatorname{proj}_{\mathbf{v}} \mathbf{u} =  
→ \left(\frac{\mathbf{u} \cdot \mathbf{v}}{\|\mathbf{v}\|^2} \right) \mathbf{v}  
→ \mathbf{v}  
\]
```


행렬과 조합기호

$$\det(A) = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

```
\[  
\det(A) = \begin{vmatrix}  
a & b \\ c & d \end{vmatrix}  
= ad - bc  
\]
```

미분과 적분

$$f'(x) = \lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

$$\int_a^b f(x) dx = \lim_{n \rightarrow \infty} \sum_{k=1}^n f(x_k) \Delta x \quad \left(\text{단, } x_k = a + k\Delta x, \Delta x = \frac{b-a}{n} \right).$$

```
\[  
f'(x) = \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}  
\]
```

```
\[  
\int_a^b f(x) dx = \lim_{n \to \infty} \sum_{k=1}^n f(x_k) \Delta x \quad \text{quad}  
\to \left( \text{단, } x_k = a + k\Delta x, \Delta x = \frac{b-a}{n} \right).  
\]
```

미분과 적분

$$\begin{aligned}\int e^x \cos x \, dx &= e^x \cos x + \int e^x \sin x \, dx \\ &= e^x \cos x + e^x \sin x - \int e^x \cos x \, dx \\ &= \frac{e^x(\sin x + \cos x)}{2} + C\end{aligned}$$

```
\[
\begin{aligned}
\int e^x \cos x \, dx &= e^x \cos x + \int e^x \sin x \, dx \\
&= e^x \cos x + e^x \sin x - \int e^x \cos x \, dx \\
&= \frac{e^x(\sin x + \cos x)}{2} + C
\end{aligned}
\]
```