

## BAB V INTEGRAL

### 5.1. Anti Turunan (Integral Tak Tentu)

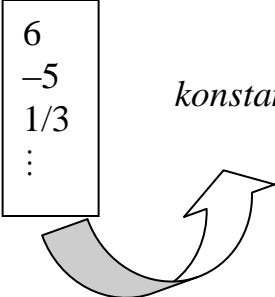
F suatu anti turunan  $f$  pada selang  $I$  jika  $D_x F(x) = f(x)$  pada  $I$ , yakni jika  $F'(x) = f(x)$  untuk semua  $x$  dalam  $I$

Contoh 1. Carilah suatu anti turunan fungsi  $f(x) = 3x^2$  pada  $(-\infty, \infty)$  !

Jawab:  $F(x) = x^3 +$ 

6
-5
1/3
⋮

*konstanta*, jadi  $F(x) = x^3 + C$



Contoh 2. Carilah anti turunan dari :

- $f(x) = 2x + 5$
- $g(x) = x^4$
- $h(x) = 2^x + \sin x$

Jawab :

- $F(x) = x^2 + 5x + C$
- $G(x) = \frac{1}{5}x + C$
- $H(x) = \frac{2^x}{\ln 2} + \cos x + C$

$\rightarrow$  *integrand*

Notasi Leibniz  $\int \cdot dx$

Meng-integralkan = anti penurunan

#### Aturan Pangkat

Jika  $r$  adalah sebarang bilangan rasional kecuali  $-1$ , maka  $\int x^r dx = \frac{x^{r+1}}{r+1} + C$

**Sifat kelinieran.** Andaikan  $f$  dan  $g$  mempunyai anti turunan (integral tak tentu) dan  $k$  suatu konstanta. Maka :

$$1) \int kf(x)dx = k \int f(x)dx$$

$$2) \int [f(x) + g(x)]dx = \int f(x)dx + \int g(x)dx$$

$$3) \int [f(x) - g(x)]dx = \int f(x)dx - \int g(x)dx$$

Contoh :

$$1. \int (x^2 + 3x)dx =$$

$$2. \int (x^3 + 4x^2 + 7x)dx =$$

$$3. \int x(x^2 + 3)^2 dx =$$

### RUMUS DASAR

$$\int k dx = kx + C$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C, n \neq -1$$

$$\int \frac{1}{x} dx = \ln|x| + C$$

$$\int a^x dx = \frac{a^x}{\ln a} + C$$

$$\int e^x dx = e^x + C$$

$$\int \cos x dx = \sin x + C$$

$$\int \sin x dx = -\cos x + C$$

$$\int \sec^2 x dx = \tan x + C$$

$$\int \operatorname{cosec}^2 x dx = -\cot x + C$$

$$\int \operatorname{cosec} x \cot x dx = -\operatorname{cosec} x + C$$

$$\int \sec x \tan x dx = \sec x + C$$

$$\int \frac{1}{\sqrt{1-x^2}} dx = \begin{cases} \arcsin x + C \\ -\arccos x + C \end{cases}$$

$$\int \frac{1}{\sqrt{1+x^2}} dx = \begin{cases} \arctan x + C \\ -\operatorname{arctan} x + C \end{cases}$$

$$\int \frac{1}{x\sqrt{x^2-1}} dx = \begin{cases} \operatorname{arc} \sec x + C \\ -\operatorname{arccosec} x + C \end{cases}$$

