

## 5.2 General Power Rule for Integration

If  $u$  is a differentiable func. of  $x$ , then

$$\int u^n \frac{du}{dx} dx = \int u^n du = \frac{u^{n+1}}{n+1} + C \quad n \neq -1$$

Ex. a)  $\int 5(5x-7)^5 dx$

b)  $\int (3x^2+6)(x^3+6x)^2 dx$

c)  $\int 2x\sqrt{x^2-2} dx$

d)  $\int \frac{-8x}{(1-4x^2)^5} dx$

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2. Multiply by a constant!

$$\int x^3 (3x^4 + 1)^2 dx$$

Ex. 3 GPR fails sometimes!

$$\int 2(3x^4 + 1)^2 dx$$

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Ex. 4. a)  $\int 5x \sqrt{x^2 + 1} dx$       b)  $\int \sqrt{1 - 2x} dx$

### 3.3 Exponential and logarithmic Integrals

Let  $u$  be a differentiable func. of  $x$ .

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

$$\int e^u \frac{du}{dx} dx = \int e^u du = e^u + C$$

Ex. a)  $\int 3e^x dx$

b)  $\int 5e^{5x} dx$

c)  $\int (e^x - x) dx$

d)  $\int e^{2x+3} dx$

e)  $\int 4x e^{x^2} dx$

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## log functions

Let  $u$  be a differentiable function of  $x$ .

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

$$\int \frac{du/dx}{u} dx = \int \frac{1}{u} du = \ln|u| + C$$

Ex. a)  $\int \frac{2}{x} dx$       b)  $\int \frac{2}{2x+1} dx$

c)  $\int \frac{6x}{x^2+1} dx$       d)  $\int \frac{4x^2 - 3x + 2}{x^2} dx$

e)  $\int \frac{2}{e^{-x}+1} dx$       f)  $\int \frac{x^2+2x+4}{x+1} dx$

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