

# Calculus I

## $\int Ae^{ax+b} dx$ , part 2

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## Example (Substitution Rule)

Find  $\int e^{3x} dx$ .

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$$dx = \frac{1}{3}du.$$



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Substitute:  $\int e^{3x} dx = \int e^u ?$

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Find  $\int e^{3x} dx$ .

Let  $u = 3x$ .

Then  $du = 3dx$

$$dx = \frac{1}{3} du.$$

Substitute:  $\int e^{3x} dx = \int e^u \frac{1}{3} du$

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Find  $\int e^{3x} dx$ .

Let  $u = 3x$ .

Then  $du = 3dx$

$$dx = \frac{1}{3} du.$$

Substitute:  $\int e^{3x} dx = \int \frac{1}{3} e^u du$

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Substitute:  $\int e^{3x} dx = \int \frac{1}{3} e^u du$

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Find  $\int e^{3x} dx$ .

Let  $u = 3x$ .

Then  $du = 3dx$

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Substitute: 
$$\begin{aligned}\int e^{3x} dx &= \int \frac{1}{3} e^u du \\ &= \frac{1}{3} e^u\end{aligned}$$

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Let  $u = 3x$ .

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Substitute: 
$$\begin{aligned}\int e^{3x} dx &= \int \frac{1}{3} e^u du \\ &= \frac{1}{3} e^u + C\end{aligned}$$

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Find  $\int e^{3x} dx$ .

Let  $u = 3x$ .

Then  $du = 3dx$

$$dx = \frac{1}{3} du.$$

$$\begin{aligned}\text{Substitute: } \int e^{3x} dx &= \int \frac{1}{3} e^u du \\ &= \frac{1}{3} e^u + C \\ &= \frac{1}{3} e^{3x} + C.\end{aligned}$$