

Logarithmic and Exponential Integrals

Find each indefinite integral exactly. Include + C and state the real domain of the integrand.

1. $\int -2 \cdot 7^x \, dx$

2. $\int -7 \cdot e^x \, dx$

3. $\int \frac{1}{x} \, dx$

4. $\int -4 \cdot 3^x \, dx$

5. $\int \frac{-10}{x} \, dx$

6. $\int \frac{5}{2} \cdot e^x \, dx$

7. $\int 9 \cdot e^x \, dx$

8. $\int -12 \cdot 3^x \, dx$

9. $\int \frac{10}{x} \, dx$

10. $\int \frac{-5}{x} \, dx$

Logarithmic and Exponential Integrals

Worked Answer Key

Find each indefinite integral exactly. Include + C and state the real domain of the integrand.

1. $\int -2 \cdot 7^x \, dx$

Divide by $\ln(7)$ when integrating 7 to a variable power.

Result: $\frac{-2 \cdot 7^x}{\ln 7} + C$

Domain: all real x .

Check: $d/dx 7^x = 7^x \ln(7)$; $\ln(7)$ cancels, so differentiating the result returns the integrand.

2. $\int -7 \cdot e^x \, dx$

Use the natural exponential rule: the antiderivative of e to the variable is unchanged.

Result: $-7 \cdot e^x + C$

Domain: all real x .

Check: $d/dx e^x = e^x$, so differentiating the result returns the integrand.

3. $\int \frac{1}{x} \, dx$

Use the reciprocal rule: the antiderivative of $1/x$ is $\ln|x|$.

Result: $\ln(|x|) + C$

Domain: x is not 0.

Check: $d/dx \ln|x| = 1/x$, so differentiating the result returns the integrand.

4. $\int -4 \cdot 3^x \, dx$

Divide by $\ln(3)$ when integrating 3 to a variable power.

Result: $\frac{-4 \cdot 3^x}{\ln 3} + C$

Domain: all real x .

Check: $d/dx 3^x = 3^x \ln(3)$; $\ln(3)$ cancels, so differentiating the result returns the integrand.

5. $\int \frac{-10}{x} \, dx$

Use the reciprocal rule: the antiderivative of $1/x$ is $\ln|x|$.

Result: $-10 \cdot \ln(|x|) + C$

Domain: x is not 0.

Check: $d/dx \ln|x| = 1/x$, so differentiating the result returns the integrand.

6. $\int \frac{5}{2} \cdot e^x \, dx$

Use the natural exponential rule: the antiderivative of e to the variable is unchanged.

Result: $\frac{5}{2} \cdot e^x + C$

Domain: all real x .

Check: $d/dx e^x = e^x$, so differentiating the result returns the integrand.

Logarithmic and Exponential Integrals

Worked Answer Key

Find each indefinite integral exactly. Include + C and state the real domain of the integrand.

7. $\int 9 \cdot e^x \, dx$

Use the natural exponential rule: the antiderivative of e to the variable is unchanged.

Result: $9 \cdot e^x + C$

Domain: all real x.

Check: $d/dx \, e^x = e^x$, so differentiating the result returns the integrand.

8. $\int -12 \cdot 3^x \, dx$

Divide by $\ln(3)$ when integrating 3 to a variable power.

Result: $\frac{-12 \cdot 3^x}{\ln 3} + C$

Domain: all real x.

Check: $d/dx \, 3^x = 3^x \ln(3)$; $\ln(3)$ cancels, so differentiating the result returns the integrand.

9. $\int \frac{10}{x} \, dx$

Use the reciprocal rule: the antiderivative of $1/x$ is $\ln|x|$.

Result: $10 \cdot \ln(|x|) + C$

Domain: x is not 0.

Check: $d/dx \, \ln|x| = 1/x$, so differentiating the result returns the integrand.

10. $\int \frac{-5}{x} \, dx$

Use the reciprocal rule: the antiderivative of $1/x$ is $\ln|x|$.

Result: $-5 \cdot \ln(|x|) + C$

Domain: x is not 0.

Check: $d/dx \, \ln|x| = 1/x$, so differentiating the result returns the integrand.