

Workbook



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Integration by Substitution

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Questions

Compute the following integral:

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

2) $\int x(2x^2+1)^5 dx$

3) $\int \frac{(\ln x)^2}{x} dx$

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

5) $\int \frac{e^x}{e^x+1} dx$

6) $\int x\sqrt{x^2+1} dx$

7) $\int \frac{x}{\sqrt{x^2+4}} dx$

8) $\int x^3\sqrt{x^2+1} dx$

9) $\int x^5\sqrt{x^2+1} dx$

10) $\int \frac{x^3}{\sqrt{x^2+4}} dx$

11) $\int \frac{x^5}{\sqrt{x^3+1}} dx$

12) $\int \sqrt[4]{x^2+1} \cdot x^3 dx$

13) $\int \frac{x^3}{\sqrt[3]{x^2+4}} dx$

14) $\int \frac{1}{x(\ln x)^4} dx$

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

16) $\int \frac{x^7}{(1-x^4)^2} dx$

17) $\int \sqrt{1+e^{2x}} dx$

18) $\int \sqrt{1+\frac{1}{x^2}} dx$

19) $\int e^{\sqrt{x}} dx$

20) $\int e^{\sqrt[3]{x}} dx$

21) $\int \frac{1}{\sqrt{x}+\sqrt[3]{x}} dx$

22) $\int \arctan(\sqrt{x}) dx$

Answer Key

- 1) $-\frac{1}{2}\ln(x^2+4)+C$
- 2) $\frac{1}{24}(2x^2+1)^6+C$
- 3) $\frac{1}{3}(\ln x)^3+C$
- 4) $\frac{1}{2}e^{x^2+4}+C$
- 5) $\ln(e^x+1)+C$
- 6) $\frac{1}{3}(x^2+1)^{\frac{3}{2}}+C$
- 7) $\sqrt{x^2+4}+C$
- 8) $\frac{1}{5}(x^2+1)^{\frac{5}{2}}-\frac{1}{3}(x^2+1)^{\frac{3}{2}}+C$
- 9) $\frac{1}{2}(x^2+1)^{\frac{7}{2}}-\frac{2}{5}(x^2+1)^{\frac{5}{2}}+\frac{1}{3}(x^2+1)^{\frac{3}{2}}+C$
- 10) $\frac{1}{3}(x^2+4)^{\frac{3}{2}}-4(x^2+4)^{\frac{1}{2}}+C$
- 11) $(x^3+1)^{\frac{3}{2}}-\frac{2}{3}(x^3+1)^{\frac{1}{2}}+C$
- 12) $\frac{2}{9}(x^2+1)^{\frac{9}{2}}-\frac{2}{5}(x^2+1)^{\frac{5}{2}}+C$
- 13) $\frac{3}{10}(x^2+4)^{\frac{5}{3}}-3(x^2+4)^{\frac{2}{3}}+C$
- 14) $\frac{-1}{3(\ln x)^3}+C$
- 15) $\frac{1}{2}(x^2-1)e^{x^2}+C$
- 16) $\frac{1}{4}\left(\frac{1}{1-x^4}+\ln(1-x^4)\right)+C$
- 17) $\sqrt{1+e^{2x}}+\frac{1}{2}\ln\left|\frac{\sqrt{1+e^{2x}}-1}{\sqrt{1+e^{2x}}+1}\right|+C$
- 18) $\sqrt{x^2+1}+\frac{1}{2}\ln\left|\frac{\sqrt{x^2+1}-1}{\sqrt{x^2+1}+1}\right|+C$
- 19) $2(\sqrt{x}-1)e^{\sqrt{x}}+C$
- 20) $3e^{\sqrt[3]{x}}\left(x^{\frac{2}{3}}-2x^{\frac{1}{3}}+2\right)+C$
- 21) $6\left[\frac{\sqrt{x}}{3}-\frac{\sqrt{x}}{2}+\sqrt[6]{x}-\ln|\sqrt[6]{x}+1|\right]+C$
- 22) $(x+1)\arctan(\sqrt{x})-\sqrt{x}+C$