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Workbook

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Integrals – Derivative Contained

Integrals – Derivative Contained

Questions:

Compute the following integrals:

1) a. $\int \dfrac{2x}{x^2+1}\,dx$ b. $\int \dfrac{x^2}{x^3+1}\,dx$ c. $\int \dfrac{x+2}{x^2+4x+1}\,dx$

2) a. $\int \cot x\,dx$ b. $\int \tan x\,dx$ c. $\int \dfrac{\sin x - \cos x}{\sin x + \cos x}\,dx$

3) a. $\int \dfrac{e^{x+2}}{e^x+1}\,dx$ b. $\int \dfrac{1}{x\ln x}\,dx$ c. $\int \dfrac{x^2+6x+4}{x^2+4x}\,dx$

4) a. $\int e^{x^2}2x\,dx$ b. $\int e^{x^3}x^2\,dx$ c. $\int \dfrac{x}{e^{2x^2}}\,dx$

5) a. $\int \dfrac{e^{\tan x}}{\cos^2 x}\,dx$ b. $\int \dfrac{e^{\arctan x}}{1+x^2}\,dx$ c. $\int \dfrac{\sin x \cos x}{e^{-\cos 2x}}\,dx$

6) a. $\int \left(\cos\left(2x^2+1\right)\cdot 4x\right)dx$ b. $\int \cos\left(\sin x\right)\cdot \cos x\,dx$ c. $\int \dfrac{\cos\left(\ln x\right)}{x}\,dx$

7) a. $\int \cos\left(10x^4+1\right)x^3\,dx$ b. $\int \sin\left(x^2+1\right)x\,dx$ c. $\int \dfrac{\sin \sqrt{x}}{\sqrt{x}}\,dx$

8) a. $\int \dfrac{\ln x}{x}\,dx$ b. $\int \dfrac{\arctan x}{1+x^2}\,dx$ c. $\int \dfrac{\tan x}{\cos^2 x}\,dx$

9) a. $\int \dfrac{2x}{\sqrt{x^2+1}}\,dx$ b. $\int \dfrac{\cos x}{\sqrt{2\sin x}}\,dx$ c. $\int \dfrac{1}{x\sqrt{\ln x}}\,dx$

10) a. $\int \sqrt{x^2+1}\cdot 2x\,dx$ b. $\int \sqrt{x^3+4}\cdot x^2\,dx$ c. $\int \dfrac{\sqrt{\ln x}}{x}\,dx$

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Answer Key:

1) a. $\ln\left|x^2+1\right|+C$
b. $\dfrac{1}{3}\ln\left|x^3+1\right|+C$
c. $\ln\left|x^2+4x+1\right|+C$

2) a. $\ln\left|\sin x\right|+C$
b. $-\ln\left|\cos x\right|+C$
c. $-\ln\left|\sin x+\cos x\right|+C$

3) a. $e^2\ln\left|e^x+1\right|+C$
b. $\ln\left|\ln x\right|+C$
c. $x+\ln\left|x^2+4x\right|+C$

4) a. $e^{x^2}+C$
b. $\dfrac{1}{3}e^{x^3}+C$
c. $-\dfrac{1}{4}e^{-2x^2}+C$

5) a. $e^{\tan x}+C$
b. $e^{\arctan x}+C$
c. $-\dfrac{1}{4}e^{\cos 2x}+C$

6) a. $\sin\left(2x^2+1\right)+C$
b. $\sin\left(\sin x\right)+C$
c. $\sin\left(\ln x\right)+C$

7) a. $\dfrac{1}{40}\sin\left(10x^4+1\right)+C$
b. $-\dfrac{1}{2}\cos\left(x^2+1\right)+C$
c. $-2\cos\sqrt{x}+C$

8) a. $\dfrac{1}{2}\left(\ln x\right)^2+C$
b. $\dfrac{1}{2}\left(\arctan x\right)^2+C$
c. $\dfrac{1}{2}\tan^2 x+C$

9) a. $2\sqrt{x^2+1}+C$
b. $2\sqrt{2\sin x}+C$
c. $2\sqrt{\ln x}+C$

10) a. $\dfrac{2}{3}\left(x^2+1\right)^{\frac{3}{2}}+C$
b. $\dfrac{2}{9}\left(x^3+4\right)^{\frac{3}{2}}+C$
c. $\dfrac{2}{3}\left(\ln x\right)^{\frac{3}{2}}+C$

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