Integrals

Question 1.

$\int_1^2 x^2 \, dx$

(a) 1

(b) $\frac{7}{3}$

(c) $\frac{1}{3}$

(d) 0

Answer:

(b) $\frac{7}{3}$

Question 2.

$\int_0^2 \left(x^2 + 3\right) dx$

(a) $\frac{25}{3}$

(b) $\frac{26}{3}$

(c) $\frac{24}{3}$

(d) None of these

Answer:

(b) $\frac{26}{3}$

Question 3.

Evaluate: $\int_0^{\pi/4} \sqrt{1 - \sin 2x} \, dx$

(a) $\sqrt{2} - 1$

(b) $\sqrt{2} + 1$

(c) $\sqrt{2}$

(d) None of these

Answer:

(a) $\sqrt{2} - 1$

Question 4.

Evaluate: $\int_0^{2\pi} \sin\left(\frac{\pi}{4} + \frac{x}{2}\right) dx$

(a) -2√2
(b) -2
(c) √2
(d) 2√2

Answer:

(d) 2√2

Question 5.

Evaluate: $\int_1^2 \frac{dx}{x^2}$

(a) $\frac{1}{2}$
(b) 1
(c) 2
(d) -1

Answer:

(a) $\frac{1}{2}$

Question 6.

Evaluate: $\int_0^1 \sin^{-1}\left(\frac{2x}{1+x^2}\right) dx$

(a) $\frac{\pi}{2} - \log 2$
(b) π
(c) $\frac{\pi}{4}$
(d) $\frac{\pi}{2} - \log 2$

Answer:

(a) $\frac{\pi}{2} - \log 2$

Question 7.

Evaluate : $\int_0^{\pi/2} \frac{\cos\theta}{(1 + \sin\theta)(2 + \sin\theta)} d\theta$

(a) $\log\left(\frac{4}{3}\right)$ (b) $\log\left(\frac{3}{4}\right)$

(c) $\log 4 + \log 3$ (d) None of these

Answer:

(a) $\log\left(\frac{4}{3}\right)$

Question 8.

Evaluate : $\int_0^1 \dfrac{x \tan^{-1} x}{(1+x^2)^{3/2}} dx$

(a) $\dfrac{4-\pi}{2\sqrt{2}}$

(b) $\dfrac{4+\pi}{2\sqrt{2}}$

(c) $\dfrac{4-\pi}{4\sqrt{2}}$

(d) None of these

Answer:
(c) $\dfrac{4-\pi}{4\sqrt{2}}$

Question 9.

Evaluate : $\int_0^{\pi/2} \dfrac{1}{3+2\cos x} dx$

(a) $\sqrt{5} \tan^{-1}\left(\dfrac{1}{\sqrt{5}}\right)$

(b) $\dfrac{\sqrt{5}}{2} \tan^{-1}\left(\dfrac{1}{\sqrt{5}}\right)$

(c) $\dfrac{2}{\sqrt{5}} \tan^{-1}\left(\dfrac{1}{\sqrt{5}}\right)$

(d) $-\dfrac{2}{\sqrt{5}} \tan^{-1}\left(\dfrac{1}{\sqrt{5}}\right)$

Answer:
(c) $\dfrac{2}{\sqrt{5}} \tan^{-1}\left(\dfrac{1}{\sqrt{5}}\right)$

Question 10.

Evaluate : $\int_0^{\pi/2} \dfrac{1}{2\cos x + 4\sin x} dx$

(a) $\sqrt{5} \log\left(\dfrac{3+\sqrt{5}}{2}\right)$

(b) $\dfrac{1}{\sqrt{55}} \log\left(\dfrac{3-\sqrt{5}}{}\right)$

(c) $\dfrac{1}{\sqrt{5}} \log\left(\dfrac{3+\sqrt{5}}{2}\right)$

(d) None of these

Answer:
(c) $\dfrac{1}{\sqrt{5}} \log\left(\dfrac{3+\sqrt{5}}{2}\right)$

Question 11.
Evaluate: ∫(2tan x – 3cot x)^2 dx
(a) -4tan x – 9cot x – 25x + C
(b) 4tan x – 9cot x – 25x + C
(c) -4tan x + 9 cot x + 25x + C
(d) 4tan x + 9cot x + 25x + C
Answer:
(b) 4tan x – 9cot x – 25x + C

Question 12.

Evaluate : $\int (e^{x\log a} + e^{a\log x} + e^{\log a}) dx$

(a) $\dfrac{a^x}{\log a} + \dfrac{x^{a+1}}{a+1} + a^a x + C$

(b) $\dfrac{a^x}{\log a} + \dfrac{x^{a+1}}{a-1} + ax^a + C$

(c) $\dfrac{a^x}{\log a} + \dfrac{x^a}{a+1} + ax^a + C$

(d) $\dfrac{a^x}{\log x} + \dfrac{x^{a+1}}{a+1} + a^a x + C$

Answer:
(a) $\dfrac{a^x}{\log a} + \dfrac{x^{a+1}}{a+1} + a^a x + C$

Question 13.

Evaluate : $\int [\sec^2(7-4x)] dx$

(a) $-\dfrac{1}{4}\tan(7-4x) + C$ (b) $\dfrac{1}{4}\tan(7-4x) + C$

(c) $\dfrac{1}{4}\tan(7+4x) + C$ (d) $-\dfrac{1}{4}\tan(7x-4) + C$

Answer:
(a) $-\dfrac{1}{4}\tan(7-4x) + C$

Question 14.

Evaluate : $\int 2^{2^{2^x}} 2^{2^x} 2^x \, dx$

(a) $\dfrac{1}{(\log 2)^3} 2^{2^{2^x}} + C$

(b) $\dfrac{1}{(\log 2)^3} 2^{2^x} + C$

(c) $\dfrac{1}{(\log 2)^2} 2^{2^x} + C$

(d) $\dfrac{1}{(\log 2)^4} 2^{2^{2^x}} + C$

Answer:

(a) $\dfrac{1}{(\log 2)^3} 2^{2^{2^x}} + C$

Question 15.

Evaluate : $\int \cos^3 x \, e^{\log \sin x} \, dx = \int \cos^3 x \sin x \, dx$

(a) $\dfrac{\cos^4 x}{4} + C$

(b) $-\dfrac{\cos^4 x}{4} + C$

(c) $\dfrac{\cos^4 x}{4x} + C$

(d) None of these

Answer:

(b) $-\dfrac{\cos^4 x}{4} + C$

Question 16.

$\int \dfrac{\cot x}{\sqrt[3]{\sin}} dx =$

(a) $\dfrac{-3}{\sqrt[3]{\sin x}} + C$

(b) $\dfrac{-2}{\sin^3 x} + C$

(c) $\dfrac{3}{\sin^{1/3} x} + C$

(d) None of these

Answer:

(a) $\dfrac{-3}{\sqrt[3]{\sin x}} + C$

Question 17.
Evaluate: ∫tan(x − θ) tan(x + θ) tan2x dx

(a) $\frac{1}{2}$ log|cos2x| – log|cos(x – θ)| + log|cos(x + θ)| + C

(b) $-\frac{1}{2}$ log|cos2x| + log|cos(x – θ)| + log|cos (x + θ)| + C

(c) $-\frac{1}{2}$ log|cos2x| – log|cos(x – θ)| – log|cos(x + θ)| + C

(d) None of these

Answer:

(b) $-\frac{1}{2}$ log|cos2x| + log|cos(x – θ)| + log|cos (x + θ)| + C

Question 18.

Evaluate : $\int \dfrac{1}{\sqrt{\sin^3 x \cos^5 x}} dx$

(a) $\dfrac{2}{\sqrt{\tan x}} - \dfrac{2}{3}(\tan x)^{3/2} + C$

(b) $-\dfrac{2}{\sqrt{\tan x}} + \dfrac{2}{3}(\tan x)^{3/2} + C$

(c) $-\dfrac{2}{\sqrt{\tan x}} - \dfrac{2}{3}(\tan x)^{2/3} + C$ (d) None of these

Answer:

(b) $-\dfrac{2}{\sqrt{\tan x}} + \dfrac{2}{3}(\tan x)^{3/2} + C$

Question 19.

Evaluate : $\int \sec^{4/3} x \operatorname{cosec}^{8/3} x \, dx$

(a) $\dfrac{3}{5} \tan^{-5/3} x - 3\tan^{1/3} x + C$

(b) $-\dfrac{3}{5} \tan^{-5/3} x + 3\tan^{1/3} x + C$

(c) $-\dfrac{3}{5} \tan^{-5/3} x - 3\tan^{1/3} x + C$

(d) None of these

Answer:

(b) $-\dfrac{3}{5}\tan^{-5/3}x + 3\tan^{1/3}x + C$

Question 20.

Evaluate : $\int \dfrac{x^3 + x}{x^4 - 9} dx$

(a) $\dfrac{1}{4} \log |x^4 - 9| + \dfrac{1}{12} \log \left| \dfrac{x^2 + 3}{x^2 - 3} \right| + C$

(b) $\dfrac{1}{4} \log |x^4 - 9| - \dfrac{1}{12} \left| \dfrac{x^2 - 3}{x^2 + 3} \right| + C$

(c) $\dfrac{1}{4} \log |x^4 - 9| + \dfrac{1}{12} \log \left| \dfrac{x^2 - 3}{x^2 + 3} \right| + C$

(d) None of these

Answer:
(c) $\frac{1}{4} \log |x^4 - 9| - \frac{1}{12} \left| \frac{x^2-3}{x^2+3} \right| + C$

Question 21.

Evaluate : $I = \int_0^{\pi/2} \dfrac{\sin 2x}{\sin^4 x + \cos^4 x}$

(a) $\dfrac{\pi}{2}$

(b) $\dfrac{\pi}{4}$

(c) $\dfrac{\pi}{3}$

(d) None of these

Answer:
(a) $\frac{\pi}{2}$

Question 22.

Evaluate : $\int_0^{\pi/2} \sqrt{\cos \theta} \sin^3 \theta \, d\theta$

(a) $\dfrac{8}{21}$

(b) $\dfrac{7}{21}$

(c) $\dfrac{8}{23}$

(d) $\dfrac{7}{23}$

Answer:
(a) $\frac{8}{21}$

Question 23.

Evaluate : $\displaystyle\int_0^{\pi/2} \dfrac{\cos x}{\left(\cos\dfrac{x}{2} + \sin\dfrac{x}{2}\right)^3}\,dx$

(a) $2 - \sqrt{2}$ (b) $2 + \sqrt{2}$ (c) $3 + \sqrt{3}$ (d) $3 - \sqrt{3}$

Answer:
(a) $2 - \sqrt{2}$

Question 24.

If $A = \displaystyle\int_0^{\pi} \dfrac{\cos x}{(x+2)^2}\,dx$, then $\displaystyle\int_0^{\pi/2} \dfrac{\sin 2x}{(x+1)}\,dx$ is equal to

(a) $A - \dfrac{1}{2} - \dfrac{1}{\pi+2}$

(b) $\dfrac{1}{2} + \dfrac{1}{\pi+2} - A$

(c) $\dfrac{1}{\pi+2} - A$

(d) $1 + \dfrac{1}{\pi+2} - A$

Answer:
(b) $\dfrac{1}{2} + \dfrac{1}{\pi+2} - A$

Question 25.

The value of $\displaystyle\int_{-\pi/2}^{\pi/2} \dfrac{dx}{e^{\sin x} + 1}$ is equal to

(a) 0 (b) 1 (c) $-\dfrac{\pi}{2}$ (d) $\dfrac{\pi}{2}$

Answer:
(d) $\dfrac{\pi}{2}$

Question 26.

The value of $\displaystyle\int_0^{2\pi} \dfrac{x\sin^{2n} x}{\sin^{2n} x + \cos^{2n} x}\,dx$ is

(a) $\dfrac{\pi^2}{4}$ (b) $\dfrac{\pi^2}{2}$ (c) π^2 (d) $2\pi^2$

Answer:

(c) π^2

Question 27.

$\int \dfrac{dx}{\sin(x-a)\sin(x-b)}$ is equal to

(a) $\sin(b-a)\log\left|\dfrac{\sin(x-b)}{\sin(x-a)}\right| + C$

(b) $\operatorname{cosec}(b-a)\log\left|\dfrac{\sin(x-a)}{\sin(x-b)}\right| + C$

(c) $\operatorname{cosec}(b-a)\log\left|\dfrac{\sin(x-b)}{\sin(x-a)}\right| + C$

(d) $\sin(b-a)\log\left|\dfrac{\sin(x-a)}{\sin(x-b)}\right| + C$

Answer:

(c) $\operatorname{cosec}(b-a)\log\left|\dfrac{\sin(x-b)}{\sin(x-a)}\right| + C$

Question 28.

$\int e^x\left(\dfrac{1-x}{1+x^2}\right)^2 dx$ is equal to

(a) $\dfrac{e^x}{1+x^2}+C$

(b) $\dfrac{-e^x}{1+x^2}+C$

(c) $\dfrac{e^x}{(1+x^2)^2}+C$

(d) $\dfrac{-e^x}{(1+x^2)^2}+C$

Answer:

(a) $\dfrac{e^x}{1+x^2}+C$

Question 29.

$\int \dfrac{x^3}{x+1}$ is equal to

(a) $x + \dfrac{x^2}{2} + \dfrac{x^3}{3} - \log|1-x| + C$

(b) $x + \dfrac{x^2}{2} - \dfrac{x^3}{3} - \log|1-x| + C$

(c) $x - \dfrac{x^2}{2} - \dfrac{x^3}{3} - \log|1+x| + C$

(d) $x - \dfrac{x^2}{2} + \dfrac{x^3}{3} - \log|1+x| + C$

Answer:

(d) $x - \frac{x^2}{2} + \frac{x^3}{3} - \log|1+x| + C$

Question 30.

If $\int \dfrac{x^3 dx}{\sqrt{1+x^2}} = a(1+x^2)^{3/2} + b\sqrt{1+x^2} + C$, then

(a) $a = \dfrac{1}{3}, b = 1$ (b) $a = \dfrac{-1}{3}, b = 1$

(c) $a = \dfrac{-1}{3}, b = -1$ (d) $a = \dfrac{1}{3}, b = -1$

Answer:

(d) $a = \frac{1}{3}$, b = -1

Question 31.

$\int_{-\pi/4}^{\pi/4} \dfrac{dx}{1+\cos 2x} dx$ is equal to

(a) 1 (b) 2 (c) 3 (d) 4

Answer:

(a) 1

Question 32.

Evaluate : $\int \dfrac{1}{\sqrt{1-e^{2x}}}dx$

(a) $\log\left|e^{-x}+\sqrt{e^{-2x}-1}\right|+C$

(b) $-\log\left|e^{-x}+\sqrt{e^{-2x}-1}\right|+C$

(c) $-\log\left|e^{-x}-\sqrt{e^{-2x}-1}\right|+C$

(d) None of these

Answer:
(b) $-\log\left|e^{-x}+\sqrt{e^{-2x}-1}\right|+C$

Question 33.

Evaluate : $\int \dfrac{1}{x(x^n+1)}dx$

(a) $\log\left|\dfrac{x^n}{x^n+1}\right|+C$

(b) $\dfrac{1}{n}\log\left|\dfrac{x^n}{x^n+1}\right|+C$

(c) $\dfrac{1}{n}\log\left|\dfrac{x^n+1}{x^n}\right|+C$

(d) None of these

Answer:
(b) $\dfrac{1}{n}\log\left|\dfrac{x^n}{x^n+1}\right|+C$

Question 34.

Evaluate : $\int \dfrac{1}{1+3\sin^2 x+8\cos^2 x}dx$

(a) $\dfrac{1}{6}\tan^{-1}(2\tan x)+C$

(b) $\tan^{-1}(2\tan x)+C$

(c) $\dfrac{1}{6}\tan^{-1}\left(\dfrac{2\tan x}{3}\right)+C$

(d) None of these

Answer:

(c) $\frac{1}{6}\tan^{-1}\left(\frac{2\tan x}{3}\right) + C$

Question 35.

The value of $\int \dfrac{dx}{\sqrt{x} + \sqrt[3]{x}}$ **is**

(a) $3\sqrt{x} + 3(\sqrt[3]{x}) - 6\sqrt[6]{x} + \log(\sqrt[6]{x} + 1) + C$

(b) $2\sqrt{x} + 6(\sqrt[6]{x}) - 6\log(\sqrt[6]{x} + 1) + C$

(c) $2\sqrt{x} - 3(\sqrt[3]{x}) + 6(\sqrt[6]{x}) - 6\log(\sqrt[6]{x} + 1) + C$

(d) None of these

Answer:

(c) $2\sqrt{x} - 3(\sqrt[3]{x}) + 6(\sqrt[6]{x}) - 6\log(\sqrt[6]{x} + 1) + C$

Question 36.

Evaluate : $\int \dfrac{\tan\theta + \tan^3\theta}{1 + \tan^3\theta}\, d\theta$

(a) $-\dfrac{1}{3}\log|1 + \tan\theta| - \dfrac{1}{6}\log|\tan^2\theta - \tan\theta + 1|$

$\qquad -\dfrac{1}{\sqrt{3}}\tan^{-1}\left(\dfrac{2\tan\theta - 1}{\sqrt{3}}\right) + C$

(b) $-\dfrac{1}{3}\log|1 + \tan\theta| + \dfrac{1}{6}\log|\tan^2\theta - \tan\theta + 1|$

$\qquad +\dfrac{1}{\sqrt{3}}\tan^{-1}\left(\dfrac{2\tan\theta - 1}{\sqrt{3}}\right) + C$

(c) $-\dfrac{1}{3}\log|1 + \tan\theta| + \dfrac{1}{6}\log|\tan^2\theta + \tan\theta + 1|$

$\qquad -\dfrac{1}{\sqrt{3}}\tan^{-1}\left(\dfrac{2\tan\theta + 1}{\sqrt{3}}\right) + C$

(d) None of these

Answer:
(b)
$$-\frac{1}{3}\log|1+\tan\theta| + \frac{1}{6}\log|\tan^2\theta - \tan\theta + 1|$$
$$+ \frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{2\tan\theta-1}{\sqrt{3}}\right) + C$$

Question 37.

Evaluate : $\displaystyle\int \frac{1-\cos x}{\cos x\,(1+\cos x)}dx$

(a) $\log|\sec x + \tan x| - 2\tan(x/2) + C$

(b) $\log|\sec x - \tan x| - 2\tan(x/2) + C$

(c) $\log|\sec x + \tan x| + 2\tan(x/2) + C$

(d) None of these

Answer:
(a) $\log|\sec x + \tan x| - 2\tan(x/2) + C$

Question 38.

If $\displaystyle\int \frac{e^x(1+\sin x)dx}{1+\cos x} = e^x f(x) + C$, then $f(x)$ is equal to

(a) $\sin\dfrac{x}{2}$　　(b) $\cos\dfrac{x}{2}$　　(c) $\tan\dfrac{x}{2}$　　(d) $\log\dfrac{x}{2}$

Answer:
(c) $\tan\dfrac{x}{2}$

Question 39.

$\displaystyle\int \frac{\cos x - 1}{\sin x + 1}e^x dx$ **is equal to**

(a) $\dfrac{e^x\cos x}{1+\sin x} + C$　　　　　　(b) $-\dfrac{e^x\sin x}{1+\sin x} + C$

(c) $\dfrac{e^x}{x+4} + C$　　　　　　(d) $-\dfrac{e^x\cos x}{1+\sin x} + C$

Answer:
(a) $\dfrac{e^x\cos x}{1+\sin x} + C$

Question 40.

$$\int \left(\frac{x+2}{x+4}\right)^2 e^x \, dx \text{ is equal to}$$

(a) $e^x\left(\dfrac{x}{x+4}\right) + C$

(b) $e^x\left(\dfrac{x+2}{x+4}\right) + C$

(c) $e^x\left(\dfrac{x-2}{x+4}\right) + C$

(d) $\left(\dfrac{2xe^x}{x+4}\right) + C$

Answer:

(b) $e^x\left(\frac{x+2}{x+4}\right) + C$

Question 41.

Evaluate : $\int \sqrt{x^2 + 2x + 5} \, dx$

(a) $-\dfrac{1}{2}(x+1)\sqrt{x^2 + 2x + 5}$

$\qquad +2\log\left|(x+1) + \sqrt{x^2 + 2x + 5}\right| + C$

(b) $\dfrac{1}{2}(x+1)\sqrt{x^2 + 2x + 5}$

$\qquad +2\log\left|(x+1) + \sqrt{x^2 + 2x + 5}\right| + C$

(c) $-\dfrac{1}{2}(x+1)\sqrt{x^2 + 2x + 5}$

$\qquad -2\log\left|(x+1) + \sqrt{x^2 + 2x + 5}\right| + C$

(d) None of these

Answer:

(b)
$\dfrac{1}{2}(x+1)\sqrt{x^2 + 2x + 5}$
$+2\log\left|(x+1) + \sqrt{x^2 + 2x + 5}\right| + C$