Integral Calculus - 1

Date Planned : __ / __ / __	Daily Tutorial Sheet - 1	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Main (Archive)	Exact Duration :________

1. The value of $\int \frac{dx}{x^2(x^4+1)^{3/4}}$ is: **(2015)**

(A) $\left(\frac{x^4+1}{x^4}\right)^{\frac{1}{4}}+c$ **(B)** $(x^4+1)^{\frac{1}{4}}+c$ **(C)** $-(x^4+1)^{\frac{1}{4}}+c$ **(D)** $-\left(\frac{x^4+1}{x^4}\right)^{\frac{1}{4}}+c$

2. $\int\left(1+x-\frac{1}{x}\right)e^{x+\frac{1}{x}}dx$ is equal to: **(2014)**

(A) $(x-1)e^{x+\frac{1}{x}}+c$ **(B)** $xe^{x+\frac{1}{x}}+c$ **(C)** $(x+1)e^{x+\frac{1}{x}}+c$ **(D)** $-xe^{x+\frac{1}{x}}+c$

3. If $\int f(x)dx=\psi(x)$, then $\int x^5 f(x^3)\,dx$ is equal to: **(2013)**

(A) $\frac{1}{3}\left[x^3\psi(x^3)-\int x^2\psi(x^3)dx\right]+c$ **(B)** $\frac{1}{3}x^3\psi(x^3)-3\int x^3\psi(x^3)dx+c$

(C) $\frac{1}{3}x^3\psi(x^3)-\int x^2\psi(x^3)dx+c$ **(D)** $\frac{1}{3}\left[x^3\psi(x^3)-\int x^3\psi(x^3)dx\right]+c$

4. The integral $\int\frac{\sin^2 x\cos^2 x}{(\sin^5 x+\cos^3 x\sin^2 x+\sin^3 x\cos^2 x+\cos^5 x)^2}dx$ is equal to: **(2018)**

(A) $\frac{-1}{1+\cot^3 x}+C$ **(B)** $\frac{1}{3(1+\tan^3 x)}+C$ **(C)** $\frac{-1}{3(1+\tan^3 x)}+C$ **(D)** $\frac{1}{1+\cot^3 x}+C$

5. If $f\left(\frac{x-4}{x+2}\right)=2x+1, (x\in R-\{1,-2\})$, then $\int f(x)\,dx$ is equal to: (where C is a constant of integration)

(A) $12\log_e|1-x|-3x+C$ **(B)** $-12\log_e|1-x|-3x+C$ **(2018)**

(C) $-12\log_e|1-x|+3x+C$ **(D)** $12\log_e|1-x|+3x+C$

6. If $\int\frac{2x+5}{\sqrt{7-6x-x^2}}dx=A\sqrt{7-6x-x^2}+B\sin^{-1}\left(\frac{x+3}{4}\right)+C$ (Where C is a constant of integration), then the ordered pair (A, B) is equal to: **(2018)**

(A) (–2, –1) **(B)** (2, –1) **(C)** (–2, 1) **(D)** (2, 1)

7. If $\int\frac{\tan x}{1+\tan x+\tan^2 x}dx=x-\frac{K}{\sqrt{A}}\tan^{-1}\left(\frac{K\tan x+1}{\sqrt{A}}\right)+C$, (C is a constant of integration), then the ordered pair (K, A) is equal to: **(2018)**

(A) (–2, 3) **(B)** (–2, 1) **(C)** (2, 1) **(D)** (2, 3)

8. The value of $\int_{-\pi/2}^{\pi/2} \frac{\sin^2 x}{1+2^x} dx$ is: **(2018)**

(A) $\frac{\pi}{4}$ **(B)** $\frac{\pi}{8}$ **(C)** $\frac{\pi}{2}$ **(D)** 4π

9. The value of the integral $\int_{-\pi/2}^{\pi/2} \sin^4 x \left(1+\log\left(\frac{2+\sin x}{2-\sin x}\right)\right) dx$ is: **(2018)**

(A) $\frac{3}{8}\pi$ **(B)** 0 **(C)** $\frac{3}{16}\pi$ **(D)** $\frac{3}{4}$

10. The value of integral $\int_{\pi/4}^{3\pi/4} \frac{x}{1+\sin x} dx$ is: **(2018)**

(A) $\pi\sqrt{2}$ **(B)** $2\pi(\sqrt{2}-1)$ **(C)** $\frac{\pi}{2}(\sqrt{2}+1)$ **(D)** $\pi(\sqrt{2}-1)$

11. For $x^2 \neq n\pi+1, n \in N$ (the set of natural numbers), the integral $\int x\sqrt{\frac{2\sin(x^2-1)-\sin 2(x^2-1)}{2\sin(x^2-1)+\sin 2(x^2-1)}}\, dx$ is:

(A) $\log_e \left|\sec\left(\frac{x^2-1}{2}\right)\right|+c$ **(B)** $\frac{1}{2}\log_e\left|\sec(x^2-1)\right|+c$ **(2019)**

(C) $\frac{1}{2}\log_e\left|\sec^2\left(\frac{x^2-1}{2}\right)\right|+c$ **(D)** $\log_e\left|\frac{1}{2}\sec^2(x^2-1)\right|+c$

12. If $f(x)=\int \frac{5x^8+7x^6}{\left(x^2+1+2x^7\right)^2} dx, \left(x \geq 0\right)$, and $f(0)=0$, then the value of $f(1)$ is: **(2019)**

(A) $-\frac{1}{4}$ **(B)** $-\frac{1}{2}$ **(C)** $\frac{1}{4}$ **(D)** $\frac{1}{2}$

13. Let $n \geq 2$ be a natural number and $0<\theta<\pi/2$. Then $\int \frac{\left(\sin^n \theta - \sin\theta\right)^{\frac{1}{n}} \cos\theta}{\sin^{n+1}\theta} d\theta$ is equal to: (where C is a constant of integration) **(2019)**

(A) $\frac{n}{n^2+1}\left(1-\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n+1}{n}}+C$ **(B)** $\frac{n}{n^2-1}\left(1-\frac{1}{\sin^{n+1}\theta}\right)^{\frac{n+1}{n}}+C$

(C) $\frac{n}{n^2-1}\left(1-\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n+1}{n}}+C$ **(D)** $\frac{n}{n^2-1}\left(1+\frac{1}{\sin^{n-1}\theta}\right)^{\frac{n+1}{n}}+C$

14. If $\int x^5 e^{-4x^3} dx = \frac{1}{48}e^{-4x^3} f(x)+C$, where C is a constant of integration, then $f(x)$ is equal to :

(A) $-2x^3-1$ **(B)** $4x^3+1$ **(C)** $-2x^3+1$ **(D)** $-4x^3-1$ **(2019)**