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Dept. of Mathematics 2025 – 2026
Class XII – Mathematics
Work Sheet – Integrals



1	If $\frac{d}{dx}f(x) = 2x + \frac{3}{x}$ and $f(1) = 1$, then $f(x)$ is: (a) $x^2 + 3\log x + 1$ (c) $x^2 + 3\log x$ (b) $2 - \frac{3}{x^2}$ (d) $x^2 + 3\log x - 4$
2	$\int \frac{x^3}{x+1} dx$ is: (a) $x + \frac{x^2}{2} + \frac{x^3}{3} - \log 1-x + C$ (c) $x - \frac{x^2}{2} - \frac{x^3}{3} - \log 1+x + C$ (b) $x + \frac{x^2}{2} - \frac{x^3}{3} - \log 1-x + C$ (d) $x - \frac{x^2}{2} + \frac{x^3}{3} - \log 1+x + C$
3	Anti-derivative of $\frac{\tan x - 1}{\tan x + 1}$ with respect to x is: (a) $\sec^2\left(\frac{\pi}{4} - x\right) + C$ (c) $\log\left \sec\left(\frac{\pi}{4} - x\right)\right + C$ (b) $\sec^2\left(\frac{\pi}{4} - x\right) + C$ (d) $-\log\left \sec\left(\frac{\pi}{4} - x\right)\right + C$
4	$\int x^2 e^{x^3} dx$ equals: (a) $\frac{1}{3} e^{x^3} + C$ (c) $\frac{1}{2} e^{x^3} + C$ (b) $\frac{1}{3} e^{x^4} + C$ (d) $\frac{1}{2} e^{x^2} + C$
5	$\int e^x \left(\frac{x \log x + 1}{x}\right) dx$ is equal to (a) $\log(e^x \log x) + C$ (c) $x \log x + e^x + C$ (b) $\frac{e^x}{x} + C$ (d) $e^x \log x + C$
6	$\int \frac{1}{\sin^2 x \cos^2 x} dx$ is: (a) $\tan x + \cot x + C$ (c) $\tan x \cot x + C$ (b) $\tan x - \cot x + C$ (d) $\tan x - \cot 2x + C$
7	Find: $\int \sqrt{\frac{x}{1-x^3}} dx ; x \in (0,1)$
8	Find $\int \frac{\sin^2 x - \cos^2 x}{\sin x \cos x} dx$
9	Write the anti-derivative of $(3\sqrt{x}) + \frac{1}{\sqrt{x}}$.

10	Evaluate $\int \cos^{-1}(\sin x) dx$
11	Find: $\int \frac{2x^2+3}{x^2x(x^2+9)} dx; x \neq 0$
12	Find: $\int e^x \left(\frac{1-\sin x}{1-\sin x} \right) dx;$
13	Find: $\int \frac{\sin^{-1}x}{(1-x^2)^{3/2}} dx;$
14	Find $\int \frac{(x^3+x+1)}{(x^2-1)} dx;$
15	Evaluate: $\int \frac{dx}{\sqrt{4x-x^2}};$
16	Find: $\int \frac{\sin 2x}{\sqrt{9-\cos^4 x}} dx;$
17	Find: $\int \frac{dx}{\sqrt{3-2x-x^2}}$
18	Integrate $\int \frac{2x}{(x^2+1)(x^2+2)};$ with respect of x.
19	Find: $\int \frac{x+1}{(x^2+1)x} dx;$
20	Find: $\int \frac{dx}{\sqrt{9-4x^2}}$
21	Find: $\int x^4 \log x dx$
22	Find: $\int \sec^3 x dx$
23	Evaluate: $\int \frac{x+1}{(x+2)(x+3)} dx$
24	Integrate: $\int \frac{2\cos x}{(1-\sin x)(1-\sin^2 x)} dx;$
25	Find: $\int \sqrt{1-\sin 2x} dx, \frac{\pi}{4} < x < \frac{\pi}{2}$

26	Evaluate: $\int \frac{dx}{\sqrt{5-4x-2x^2}}$
27	Integrate the function $\frac{\cos(x+a)}{\sin(x+b)}$ with respect to x.
28	Find: $\int \frac{\sec^2 x}{\sqrt{\tan^2 x + 4}} dx$;
29	Find: $\int \frac{\log x}{(1+\log x)^2} dx$;
30	Integrate: $\int \frac{\log x}{e^x + 1} dx$;
31	Find: $\int \frac{2\cos x}{(1-\sin x)(2-\cos^2 x)} dx$;
32	Find: $\int \frac{2x}{(x^2+1)(x^4+4)} dx$.
33	Find: $\int \frac{\cos \theta}{(4+\sin^2 \theta)(5-4\cos^2 \theta)} d\theta$
34	Find: $\int \frac{dx}{5-8x-x^2}$
35	Find: $\int \frac{(3\sin \theta - 2)\cos \theta}{5-\cos^2 \theta - 4\sin \theta} d\theta$
36	Evaluate: $\int \frac{\sqrt{x}}{\sqrt{e^3 - x^3}} dx$
37	Integrate the following rational function: $\frac{x}{(x-1)^2(x+2)}$ with respect to x
38	Find $\int \frac{x^2+x+1}{(x+2)(x^2+1)} dx$
39	Find $\int \frac{x^3}{(x^4+3x^2+2)} dx$
40	Evaluate: $\int (\sqrt{\cot x} + \sqrt{\tan x}) dx$
41	Find: $\int \frac{x^2}{(x^2+1)(x^2+4)} dx$

Answers

1	(c) $x^2 + 3\log x $	2	(d) $x - \frac{x^2}{2} + \frac{x^3}{3} - \log 1 + x + C$
3	(c) $\log \left \sec \left(\frac{\pi}{4} - x \right) \right + C$	4	(a) $\frac{1}{3}e^{x^3} + C$
5	(d) $e^x \log x + C$	6	(b) $\tan x - \cot x + C$
7	$\frac{2}{3} \sin^{-1} \left(x^{\frac{3}{2}} \right) + c,$	8	$\log \sec x - \log \sin x + C$
9	$2\sqrt{x}(x+1) + C$	10	$\frac{\pi}{2}x - \frac{x^2}{2} + C$
11	$-\frac{1}{3x} + \frac{5}{9} \tan^{-1} \left(\frac{x}{3} \right) + c$	12	$\therefore I = e^x \left(-\cot \frac{x}{2} \right) + c$
13	$\sin^{-1} x \cdot \frac{x}{\sqrt{1-x^2}} + \log \sqrt{1-x^2} + C$	14	$\frac{x^2}{2} + \frac{3}{2} \log x-1 + \frac{1}{2} \log x+1 + C$
15	$\sin^{-1} \left(\frac{x-2}{2} \right) + c$	16	$-\sin^{-1} \frac{t}{3} + C$

17	$\sin^{-1} \left(\frac{x+1}{2} \right) + C$	18	$\ln \left(\frac{ x^2+1 }{ x^2+2 } \right)$
19	$\tan^{-1} x - \frac{1}{2} \log (x^2 + 1) + \log x + C$	20	$\frac{1}{2} \sin^{-1} \left(\frac{2x}{3} \right) + C$
21	$\frac{1}{5} x^5 \log x - \frac{x^5}{25} + C$		
22	$\frac{\tan x \cdot \sec x}{2} + \frac{1}{2} \log \tan x + \sec x + C$		
23	$ = -\log x+2 + 2\log x+3 + c$		
24	$I = -\ln (\sin x - 1) + \frac{1}{2} \ln (\sin^2 x + 1)$		
25	$-(\sin x + \cos x) + C$	26	$\frac{1}{\sqrt{2}} \sin^{-1} \frac{\sqrt{2}(x+1)}{\sqrt{7}} + C$
27	$\cos (a-b) \log \sin (x+b) - x \sin (a-b) + C$		
28	$\log \left \tan x + \sqrt{\tan^2 x + 4} \right + c$	29	$\frac{x}{1 + \log x} + C$
30	$x - \ln (1 + e^x) + c$		

31	$= -\log 1 - v + \frac{1}{2} \log 1 + v^2 + \tan^{-1} v + C$		
32	$\frac{1}{5} \log \left \frac{x^2 + 1}{\sqrt{x^4 + 4}} \right + \frac{1}{10} \tan^{-1} \left(\frac{x^2}{2} \right) + C$		
33	$\frac{2}{15} \tan^{-1} (2 \sin \theta) - \frac{1}{30} \tan^{-1} \left(\frac{\sin \theta}{2} \right) + C$		
34	$\frac{1}{2\sqrt{21}} \log \left \frac{\sqrt{21} + x + 4}{\sqrt{21} - x - 4} \right + C$	35	$= 3 \log \sin \theta - 2 - \frac{4}{(\sin \theta - 2)} + C$
36	$\frac{2}{3} \sin^{-1} \frac{x^{3/2}}{a^{3/2}} + C$	37	$\frac{2}{9} \log \left \frac{x - 1}{x + 2} \right - \frac{1}{3(x - 1)} + C$
38	$\frac{3}{5} \log x + 2 + \frac{1}{5} \log x^2 + 1 + \frac{1}{5} \tan^{-1} (x) + C$		
39	$\ln x^2 + 2 - \frac{1}{2} \ln x^2 + 1 + C$		
40	$\sqrt{2} \tan^{-1} \left(\frac{\tan x - 1}{\sqrt{2 \tan x}} \right) + C$	41	$-\frac{1}{3} \tan^{-1} x + \frac{2}{3} \tan^{-1} \frac{x}{2} + C$