

CHALLENGE 30 ON INTEGRALS

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Q01. $\int \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}} \frac{dx}{x}$

Q02. $\int \frac{x + \sqrt{1-x^2} \sin^{-1} x}{\sqrt{1-x^2}} dx$

Q03. $\int \frac{x}{1+\sec x} dx$

Q04. $\int \cos 2\theta \log \left(\frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta} \right) d\theta$

Q05. $\int \sqrt{\frac{x}{a^3-x^3}} dx$

Q06. $\int a^x \left[\log x + \log a \log \left(\frac{x^x}{e^x} \right) \right] dx$

Q07. $\int \frac{1}{\sqrt{1-e^{2x}}} dx$

Q08. $\int \frac{1}{x^{2/3} \sqrt{x^{2/3}-4}} dx$

Q09. $\int \frac{1}{(3 \sin x + 2 \cos x)^2} dx$

Q10. $\int x^2 \sqrt{ax+b} dx$

Q11. $\int \frac{2}{1-\sin 2x} dx$

Q12. $\int \frac{\sin^2 x}{(1+\cos x)^2} dx$

Q13. $\int \frac{\sqrt{1+x^2}}{1-x^2} dx$

Q14. $\int \sec^2 x \operatorname{cosec}^2 x dx$

Q15. $\int \frac{x e^{m \sin^{-1} x}}{\sqrt{1-x^2}} dx$

Q16. $\int \frac{e^{2x}}{1+e^x} dx$

Q17. $\int \frac{\sin 2x}{\sin^4 x - \cos^4 x} dx$

Q18. $\int \sin^3 \sqrt{x} dx$

Q19. $\int x 2^x dx$

Q20. $\int \sqrt{\frac{\sin(x-\alpha)}{\sin(x+\alpha)}} dx$

Q21. $\int (\tan x - x) \tan^2 x dx$

Q22. $\int \frac{1+\sin x}{\sin x(1+\cos x)} dx$

Q23. $\int \frac{\sqrt{x^2+1}}{x^4} dx$

Q24. $\int \frac{\cos x - \cos 2x}{1 - \cos x} dx$

Q25. $\int \frac{\cos 5x + \cos 4x}{1 - 2 \cos 3x} dx$

Q26. $\int \sin^{-1} \sqrt{\frac{x}{a+x}} dx$

Q27. $\int (\tan \log x + \sec^2 \log x) dx$

Q28. $\int \frac{1}{(\sin x - 2 \cos x)(2 \sin x + \cos x)} dx$

Q29. $\int (1+x-x^{-1}) \cdot e^{x+x^{-1}} dx$

Q30. $\int \frac{dx}{\cos^3 x \sqrt{\sin 2x}}$

I think, I can solve all these questions. I will be a winner surely...!!



❖ HINTS/ANSWERS ❖

- Q01. Put $x = t^2 \Rightarrow \log \left(\frac{\sqrt{1-x}-1}{\sqrt{1-x}+1} \right) - 2 \sin^{-1} \sqrt{x} + k$ Q02. $x \sin^{-1} x + k$
- Q03. $\frac{x^2}{2} - x \tan \frac{x}{2} - 2 \log \left| \cos \frac{x}{2} \right| + k$ Q04. $\frac{\sin 2\theta}{2} \log \tan \left(\frac{\pi}{4} + \theta \right) - \frac{1}{2} \log |\sec 2\theta| + k$
- Q05. $\frac{2}{3} \sin^{-1} \left(\frac{x}{a} \right)^{3/2} + k$ Q06. $a^x x \log \left(\frac{x}{e} \right) + k$ Q07. $x - \log |1 + \sqrt{1 - e^{2x}}| + k$
- Q08. $3 \log |x^{1/3} + \sqrt{x^{2/3} - 4}| + k$ Q09. $-\frac{1}{3(3 \tan x + 2)} + k$
- Q10. $\frac{2}{a^3} (ax + b)^{3/2} \left[\frac{(ax + b)^2}{7} - \frac{2b}{5} (ax + b) + \frac{b^2}{3} \right] + k$ Q11. $\tan \left(\frac{\pi}{4} + x \right) + k$
- Q12. $2 \tan \frac{x}{2} - x + k$ Q13. $-\log \left| x + \sqrt{1 + x^2} \right| + \frac{1}{\sqrt{2}} \log \left| \frac{\sqrt{x^2 + 1} + x\sqrt{2}}{\sqrt{x^2 + 1} - x\sqrt{2}} \right| + k$
- Q14. $\tan x - \cot x + k$ Q15. $\frac{e^{m \sin^{-1} x}}{1 + m^2} [mx - \sqrt{1 - x^2}] + k$
- Q16. $e^x - \log |1 + e^x| + k$ Q17. $\frac{1}{2} \log |\cos 2x| + k$
- Q18. $\frac{2}{9} \sin^3 \sqrt{x} + \frac{2}{3} \sqrt{x} \cos^3 \sqrt{x} - 2\sqrt{x} \cos \sqrt{x} + \frac{4}{3} \sin \sqrt{x} + k$
- Q19. $\frac{2^x}{\log_e 2} [x - \log_2 e] + k$ Q20. $-\cos \alpha \sin^{-1} \left(\frac{\cos x}{\sin \alpha} \right) - \sin \alpha \log |\sin x + \sqrt{\sin^2 x - \sin^2 \alpha}| + k$
- Q21. $\frac{1}{2} (\tan x - x)^2 + k$ Q22. $\tan \left(\frac{x}{2} \right) + \frac{1}{4} \tan^2 \left(\frac{x}{2} \right) + \frac{1}{2} \log \left| \tan \left(\frac{x}{2} \right) \right| + k$
- Q23. $-\frac{1}{3} \left(1 + \frac{1}{x^2} \right)^{3/2} + k$ Q24. $2 \sin x + x + k$
- Q25. Multiply & Divide Nr & Dr both by $\sin 3x \Rightarrow -\frac{1}{2} [2 \sin x + \sin 2x] + k$
- Q26. $(x + a) \tan^{-1} \sqrt{\frac{x}{a}} - \sqrt{ax} + k$ Q27. $x \tan \log x + k$ Q28. $\frac{1}{5} \log \left| \frac{\tan x - 2}{2 \tan x + 1} \right| + k$
- Q29. Change $\int (1 + x - x^{-1}) \cdot e^{x+x^{-1}} dx$ into $\int \left[e^{\left(\frac{x+1}{x} \right)} + x \left(1 - \frac{1}{x^2} \right) e^{\left(\frac{x+1}{x} \right)} \right] dx$
- Then use $\int [f(x) + xf'(x)] dx = xf(x) + k$ to get $x \cdot e^{x+x^{-1}} + k$
- Q30. Change $\int \frac{dx}{\cos^3 x \sqrt{\sin 2x}}$ into $\int \frac{dx}{\cos^4 x \sqrt{2 \tan x}} = \int \frac{\sec^4 x dx}{\sqrt{2 \tan x}} \Rightarrow \sqrt{2 \tan x} \left(1 + \frac{1}{5} \tan^2 x \right) + k.$

Hi, All!

I hope this texture may have proved beneficial for you.

While going through this material, if you noticed any error(s) or, something which doesn't make sense to you, please bring it in my notice through SMS or Call at +91-9650 350 480 or Email at theopgupta@gmail.com.

With lots of Love & Blessings!

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