

TOPIC: “DEFINITE INTEGRATION”

1. Prove that $\int_{-a}^a f(x)dx = 2\int_0^a f(x)dx$, if $f(x)$

=0, if $f(x)$ is an odd function.

2. Prove that $\int_0^{2a} f(x)dx = \int_0^a f(x)dx + \int_0^a f(2a-x)dx$.

3. Prove that $\int_a^b f(x)dx = \int_a^b f(a+b-x)dx$; Hence evaluate: $\int_a^b \frac{f(x)}{f(x)+f(a+b-x)}dx$.

4. Prove that $\int_0^{2a} f(x)dx = \int_0^a f(x)dx + \int_0^a f(2a-x)dx$.

5. Evaluate: $\int_0^{\frac{\pi}{2}} \frac{1}{1+\cos x} dx$.

6. Evaluate: $\int_0^{\pi} \frac{x \sin x}{1+\sin x} dx$.

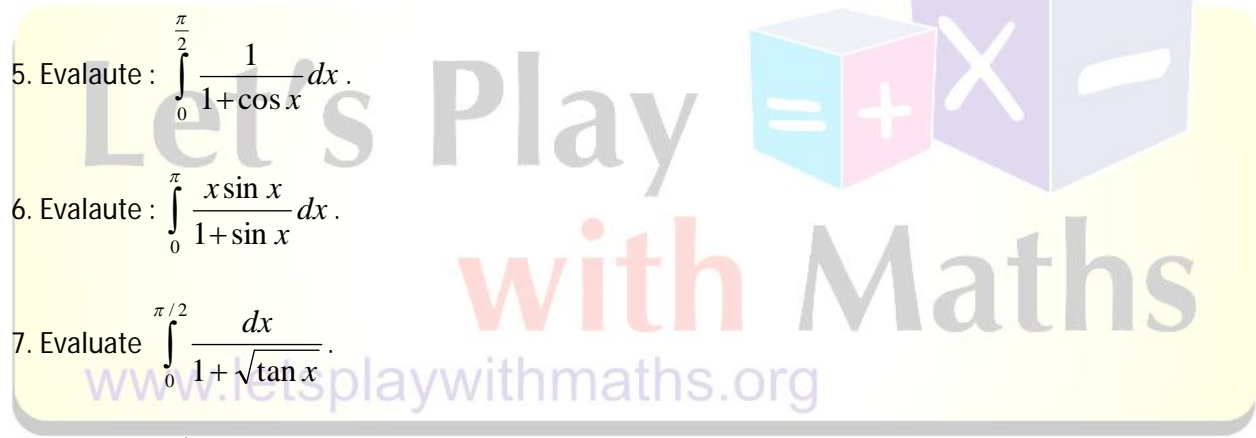
7. Evaluate $\int_0^{\pi/2} \frac{dx}{1+\sqrt{\tan x}}$.

8. Show that $\int_0^1 \frac{dx}{\sqrt{x^2-x+1}} = \log 3$.

9. If $\int_0^h \frac{1}{2+8x^2} dx = \frac{\pi}{16}$, then find the value of h.

10. Evaluate: $\int_0^1 x \cdot \tan^{-1} x dx$.

11. Evaluate $\int_0^3 x^2(3-x)^{\frac{1}{2}} dx$.



12. Evaluate $\int_0^{\pi/4} \frac{\sec^2 x dx}{(1 + \tan x)(2 + \tan x)}$.

13. Show that : $\int_0^a x^2 (a-x)^{\frac{3}{2}} dx = \frac{16}{3} a^{\frac{9}{5}}$.

14. Evaluate : $\int_0^1 x^2 (1-x)^{\frac{5}{2}} dx$.

15. Evaluate: $\int_0^{\pi/2} \frac{\sin 2x}{2 + 2 \sin^2 x + \cos^2 x} dx$

16. Evaluate: $\int_{-1}^1 \frac{dx}{a^2 e^x + b^2 e^{-x}}$

17. Evaluate: $\int_0^1 \frac{dx}{x + \sqrt{1+x^2}}$

18. Show that : $\int_1^3 \frac{\sqrt[3]{x+5}}{\sqrt[3]{x+5} + \sqrt[3]{9-x}} dx = 1$

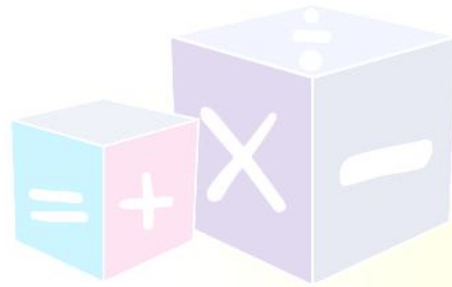
19. Evaluate: $\int_{-1}^1 f(x) dx$, if $f(x) = 1 - 2x$, for $x \leq 0$
 $= 2x + 1$. For $x \geq 0$

20. Evaluate: $\int_0^1 x^2 e^x dx$

21. Evaluate : $\int_0^{\pi/4} e^x (1 + \tan x + \tan^2 x) dx$

22. Evaluate: $\int_1^3 \frac{\sqrt[3]{x+5}}{\sqrt[3]{x+5} + \sqrt[3]{9-x}} dx$

23. Prove that $\int_0^{\pi/4} \log (1 + \tan \theta) d\theta = \frac{\pi}{8} \log 2$



24. Evaluate: $\int_0^1 \tan^{-1} \left(\frac{x}{\sqrt{1-x^2}} \right) dx$

Page | 3 25. Show that: $\int_2^3 \frac{dx}{x(x^3-1)} = \frac{1}{3} \log \left(\frac{208}{189} \right)$

26. Evaluate: $\int_0^{\pi/4} \log(1 + \tan x) dx$

27. If $\int_0^a 3x^2 dx = 8$, then the value of a is :

- (a) 0 (b) -2 (c) 2 (d) ± 2

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