

Date Planned : __ / __ / __	Daily Tutorial Sheet - 4	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Advanced (Archive)	Exact Duration : _____

31. Integrate $\int_0^{\pi/4} \log(1 + \tan x) dx$. (1997)
32. Determine the value of $\int_{-\pi}^{\pi} \frac{2x(1 + \sin x)}{1 + \cos^2 x} dx$. (1995)
33. Evaluate the definite integral $\int_{-1/\sqrt{3}}^{1/\sqrt{3}} \left(\frac{x^4}{1-x^4} \right) \cos^{-1} \left(\frac{2x}{1+x^2} \right) dx$. (1995)
34. Evaluate: $\int_2^3 \frac{2x^5 + x^4 - 2x^3 + 2x^2 + 1}{(x^2 + 1)(x^4 - 1)} dx$. (1993)
35. A cubic $f(x)$ vanishes at $x = -2$ and has relative minimum / maximum at $x = -1$ and $x = 1/3$.
If $\int_{-1}^1 f(x) dx = 14/3$, find the cubic $f(x)$. (1992)
36. Evaluate $\int_0^{\pi} \frac{x \sin(2x) \sin\left(\frac{\pi}{2} \cos x\right)}{2x - \pi} dx$. (1991)
37. Prove that for any positive integer k , $\frac{\sin 2kx}{\sin x} = 2[\cos x + \cos 3x + \dots + \cos(2k-1)x]$ (1990) 
Hence, prove that $\int_0^{\pi/2} \sin 2kx \cdot \cot x dx = \pi/2$.
38. If f and g are continuous functions on $[0, a]$ satisfying $f(x) = f(a-x)$ and $g(x) + g(a-x) = 2$, then show that $\int_0^a f(x)g(x)dx = \int_0^a f(x)dx$. (1989) 
39. Prove that the value of the integral, $\int_0^{2a} \frac{f(x)}{f(x) + f(2a-x)} dx$ is equal to a . (1988)
40. Evaluate $\int_0^1 \log \left[\sqrt{1-x} + \sqrt{1+x} \right] dx$. (1988)