FAQ's

1. What do you mean reduction formula?

   Answer:

   Reduction formula is a one which connects a given integral of some type but of a lower degree of easier to evaluate using any technique of integration.

2. Give the reduction formula for $\int \sin^n x dx$

   Answer:

   I. If n is positive odd integer,

   $$\text{In}=(\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})\ldots\ldots\ldots\frac{2}{3}I_1$$

   II. If n is positive even integer then

   $$\text{In}=(\frac{n-1}{n})(\frac{n-3}{n-2})(\frac{n-5}{n-4})\ldots\ldots\ldots\frac{1}{2}I_0$$

3. Evaluate $\int_0^{\frac{\pi}{4}} \sec^4 x dx$

   Answer:

   Putting n=4 is the reduction formula for $\sec^4 x dx$ we get

   $$I_4 = \frac{\sec^2 x \tan x}{3} + \frac{2}{3} I_2$$

   $$\int_0^{\frac{\pi}{4}} \sec^4 x dx = \left| \frac{\sec^2 x \tan x}{3} \right|_0^{\frac{\pi}{4}} + \frac{2}{3} \int_0^{\frac{\pi}{4}} \sec^2 x dx$$

   $$= \frac{2}{3} + \frac{2}{3} \left| \tan x \right|_0^{\frac{\pi}{4}} = \frac{2}{3}(1+1) = \frac{4}{3}$$

4. Evaluate $\int_0^{\frac{\pi}{2}} \cos^7 x dx$

Answer:

Let I= $\int_0^{\frac{\pi}{2}} \cos^7 x dx$

n=7 is odd positive integer

Therefore I= $\int_0^{\frac{\pi}{2}} \cos^7 x dx = \frac{(7-1)(7-3)(7-5)}{(7)(7-2)(7-4)}$

$= \frac{6X4X2}{7X5X3} = \frac{16}{35}$

5. State Taylor's theorem

Answer:

If a function f(x) is such that f(x), f'(x),f''(x).....f^{n-1}(x) are continues in [a,a+h].

Then at least one value θ between 0 and 1 such that f(a+h)=f(a)+f'(a)+$\frac{h^2}{2!} f''(a) + \ldots\ldots\ldots + \frac{h^{n-1}}{(n-1)!} f^{n-1}(a) + \frac{h^n}{n!} f^n(a+\theta h)$.