

12/09/xx

Class-XII^{sc} (MATHS) K. Kanhaiya

1) Integrate

$$\int \frac{dx}{x^2 - 6x + 13}$$

$$\int \frac{dx}{\underbrace{(x)^2 - 2 \cdot x \cdot 3 + 3^2 - 3^2 + 13}} = \int \frac{dx}{(x-3)^2 + 4}$$

$$\int \frac{dx}{(x-3)^2 + 2^2} = \frac{1}{2} \tan^{-1} \frac{x-3}{2} + C.$$

2) $\int \frac{dx}{3x^2 + 13x - 20}$

$$\int \frac{dx}{3 \left[x^2 + \frac{13}{3}x - \frac{20}{3} \right]} = \frac{1}{3} \int \frac{dx}{\left[x^2 + \frac{13}{3}x - \frac{20}{3} \right]}$$

$$= \frac{1}{3} \int \frac{dx}{\left[(x)^2 + 2 \cdot x \cdot \frac{13}{6} + \left(\frac{13}{6}\right)^2 - \left(\frac{13}{6}\right)^2 - \frac{20}{3} \right]}$$

$$= \frac{1}{3} \int \frac{dx}{\left(x + \frac{13}{6} \right)^2 - \frac{289}{36}}$$

$$= \frac{1}{3} \int \frac{dx}{\left(x + \frac{13}{6} \right)^2 - \left(\frac{17}{6} \right)^2}$$

$$\frac{1}{3} \times \frac{1}{2 \times \frac{17}{63}} \log \left| \frac{x + \frac{13}{6} - \frac{17}{6}}{x + \frac{13}{6} + \frac{17}{6}} \right|$$

$$\frac{1}{17} \log \left| \frac{6x + 13 - 17}{6x + 13 + 17} \right|$$

$$\frac{1}{17} \log \left| \frac{6x - 4}{6x + 30} \right| = \frac{1}{17} \log \left| \frac{2(3x - 2)}{2(3x + 15)} \right|$$

$$= \frac{1}{17} \log \left| \frac{3x - 2}{3x + 15} \right| + C$$

do yourself :-

$$i) \int \frac{dx}{\sqrt{1+4x^2}} \quad \Rightarrow \int \frac{dx}{\sqrt{(2-x)^2+1}}$$

$$ii) \int \frac{dx}{\sqrt{9-25x^2}} \quad \Rightarrow \int \frac{x^2 dx}{1-x^6}$$

$$\int \frac{x-1}{\sqrt{x-1}} dx$$