Dr. K. Karuppasamy

(www.drkk.in)

Yahoo Answer dated 11-09-2013

Question: Evaluate $\int_0^{0.5} \sin^{-1} x \; dx$

Solution: Take $u = \sin^{-1} x$ and $dv = dx$, hence $du = \frac{dx}{\sqrt{1-x^2}}$ and $v = x$.

By integration by parts,
$\int_0^{0.5} \sin^{-1} x \; dx = \left[x \sin^{-1} x\right]_0^{0.5} - \int_0^{0.5} x \frac{dx}{\sqrt{1-x^2}} = 0.5 \sin^{-1}(0.5) + \frac{1}{2} \int_1^{0.75} \frac{dt}{\sqrt{t}}$ where $t = 1 - x^2$.

$= \frac{\pi}{12} + \left[\sqrt{t}\right]_1^{0.75} = \frac{\pi}{12} + \sqrt{0.75} - 1$