

Harder Reduction Formula Questions

$$I_n = \int_0^1 x(1 - x^3)^n dx$$

$$I_n = \int_0^1 x\sqrt{1 - x^2} dx$$

$$I_n = \int_0^1 x^n(1 - x)^{\frac{3}{2}} dx$$

$$I_n = \int_0^1 x^n\sqrt{1 - x} dx$$

$$I_n = \int_0^1 (1 - x^2)^n dx$$

$$I_n = \int_0^1 x^n \ln(1 + x) dx$$

$$I_n = \int_0^{\sqrt{3}} (3 - x^2)^n dx$$

$$I_n = \int_0^1 x^n (1 - x^2) dx$$

Harder Reduction Formula Questions - Answers

$$I_n = \frac{2n}{3n+2} I_{n-1}$$

$$I_n = \frac{n-1}{n+2} I_{n-2}$$

$$I_n = \frac{2n}{2n+5} I_{n-1}$$

$$I_n = \frac{2n}{2n+3} I_{n-1}$$

$$I_n = \frac{2n}{2n+1} I_{n-1}$$

$$I_n = \frac{\ln 2}{n+1} - \frac{1}{n+1} I_{n-1}$$

$$I_n = \frac{6n}{2n+1} I_{n-1}$$

$$I_n = \frac{1}{n+1} - \frac{1}{n+3}$$

$$I_n = \int_0^1 x(1-x^3)^n dx$$

$u = (1-x^3)^n$	$v = \frac{x^2}{2}$
$\frac{du}{dx} = n(1-x^3)^{n-1} \cdot -3x^2$	$dv = x$

$$\begin{aligned} I_n &= \left[(1-x^3)^n \cdot \frac{x^2}{2} \right]_0^1 + \frac{3}{2} \int x^4 n(1-x^3)^{n-1} dx \\ &= [0-0] + \frac{3n}{2} \int x^4 (1-x^3)^{n-1} dx \end{aligned}$$

$$\begin{aligned} x^4 &= x \cdot x^3 \\ &= x \cdot (1 - (1-x^3)) \\ &= x - x(1-x^3) \end{aligned}$$

$$\begin{aligned} I_n &= \frac{3n}{2} \int (x - x(1-x^3))(1-x^3)^{n-1} dx \\ &= \frac{3n}{2} \int x(1-x^3)^{n-1} - x(1-x^3)(1-x^3)^{n-1} dx \end{aligned}$$

$$I_n = \frac{3n}{2} (I_{n-1} - I_n)$$

$$I_n = \frac{3n}{2} I_{n-1} - \frac{3n}{2} I_n$$

$$\left(1 + \frac{3n}{2}\right) I_n = \frac{3n}{2} I_{n-1}$$

$$\frac{2+3n}{2} I_n = \frac{3n}{2} I_{n-1}$$

$$I_n = \frac{3n}{2+3n} I_{n-1}$$