Reduction Formulae

Here's a summary of reduction formula. Detailed handwritten derivations are available.

Circular Functions

If $I_n = \int \sin^n x \, dx$ then $I_n =$

$(^{-1}/_n) \sin^{n-1}x \cos x + (^{n-1}/_n) I_{n-2}$

If $I_n = \int \cos^n x \, dx$ then $I_n =$

$(^{1}/_{n+2})\cos^{n-1}x \sin x + (^{n(n+1)}/_{n+2}) I_{n-2}$

If $I_n = \int \tan^n x \, dx$ then

$I_n = (^{1}/_{n-1})\tan^{n-1}x - I_{n-2}$

Inverse Circular Functions

If $I_n = \int \operatorname{cosec}^n x \, dx$ then $I_n =$

$(^{-1)}/_{n-1})\operatorname{cosec}^{n-2}x \cot x +$

$(^{n-2}/_{n-1})I_{n-2}$

If $I_n = \int \sec^n x \, dx$ then $I_n =$

$(^{1)}/_{n-1})\sec^{n-2}x \tan x + (^{n-2}/_{n-1})I_{n-2}$

If $I_n = \int \cot^n x \, dx$ then

$I_n = (^{-1}/_{n-1})\cot^{n-1} x - I_{n-2}$

Hyperbolic Functions

If $I_n = \int \sinh^n x \, dx$ then $I_n =$

$(^{1}/_n)\sinh^{n-1} x \cosh x - (^{n-1}/_n)I_{n-2}$

If $I_n = \int \cosh^n x \, dx$ then $I_n =$

$(^{1}/_n)\cosh^{n-1} x \sinh x - (^{n-1}/_n)I_{n-2}$

If $I_n = \int \tanh^n x \, dx$ then $I_n =$

$(^{-1}/_{n-1}) \tanh^{n-1} x + I_{n-2}$

Inverse Hyperbolic Functions

If $I_n = \int \operatorname{cosech}^n x \, dx$ then $I_n =$

$(^{-1}/_{n-1})\operatorname{cosech}^{n-1} \coth x +$

$(^{n-2}/_{n-1})I_{n-2}$

If $I_n = \int \operatorname{sech}^n x \, dx$ then $I_n =$

$(^{1}/_{n-1}) \operatorname{sech}^{n-2}x\tanh x + (^{n-2}/_{n-1})I_{n-2}$

If $I_n = \int \coth^n x \, dx$ then $I_n =$

$(^{-1}/_{n-1}) \coth^{n-1} + I_{n-2}$

Exponential Functions

If $I_n = \int x^n e^x \, dx$ then

$I_n = x^n e^x - n\, I_{n-1}$

If $I_n = \int (\ln x)^n \, dx$ then

$I_n = x\, (\ln x)^n - n\, I_{n-1}$

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$(^{1}/_n) \sinh^{n-1} x \cosh x - (^{n-1}/_n) I_{n-2}$

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If $I_n = \int \mathrm{sech}^n x \, dx$ then $I_n =$

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If $I_n = \int \coth^n x \, dx$ then $I_n =$

$(^{-1}/_{n-1}) \coth^{n-1} + I_{n-2}$

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$I_n = x^n e^x - n \, I_{n-1}$

If $I_n = \int (\ln x)^n \, dx$ then

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