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TEMA: INTEGRALES DE FUNCIONES HIPERBOLICAS

GRADO: 6º A

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BIBLIOGRAFIA: https://www.derivadas.es/integrales-trigonometricas-e-hiperbolicas/#:~:text=Integrales%20de%20funciones%20hiperb%C3%B3licas,-Las%20funciones&text=Las%20funciones%20hiperb%C3%B3licas%20b%C3%A1sicas%20son,la%20tangente%20hiperb%C3%B3lica%20tanhx

INTEGRALES DE FUNCIONES HIPERBOLICAS

Las funciones hiperbólicas son análogas a las funciones ordinarias.

Las funciones hiperbólicas básicas son:

- El seno hiperbólico sinhx
- El coseno hiperbólico coshx de donde podemos derivar la tangente hiperbólica tanhx

Las identidades trigonométricas hiperbólicas formulario más básicas son las siguientes:

75) $\int \sinh cx\, dx = \frac{1}{c} \cosh cx$

76) $\int \cosh cx\, dx = \frac{1}{c} \sinh cx$

77) $\int \sinh^2 cx\, dx = \frac{1}{4c} \sinh 2cx - \frac{x}{2}$

78) $\int \cosh^2 cx\, dx = \frac{1}{4c} \sinh 2cx + \frac{x}{2}$

79) $\int \sinh^n cx\, dx = \frac{1}{cn} \sinh^{n-1} cx \cosh cx - \frac{n-1}{n} \int \sinh^{n-2} cx\, dx \qquad (\text{para } n > 0)$

80) $\int \sinh^n cx\, dx = \frac{1}{c(n+1)} \sinh^{n+1} cx \cosh cx - \frac{n+2}{n+1} \int \sinh^{n+2} cx\, dx \qquad (\text{para } n < 0,\, n \neq -1)$

81) $\int \cosh^n cx\, dx = \frac{1}{cn} \sinh cx \cosh^{n-1} cx + \frac{n-1}{n} \int \cosh^{n-2} cx\, dx \qquad (\text{para } n > 0)$

82) $\int \cosh^n cx\, dx = -\frac{1}{c(n+1)} \sinh cx \cosh^{n+1} cx + \frac{n+2}{n+1} \int \cosh^{n+2} cx\, dx \qquad (\text{para } n < 0, n \neq -1)$

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83) $\int \cosh^n cx\, dx = -\frac{1}{c(n+1)} \sinh cx \cosh^{n+1} cx + \frac{n+2}{n+1} \int \cosh^{n+2} cx\, dx \qquad (\text{para } n < 0, n \neq -1)$

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84) $\int \frac{dx}{\sinh cx} = \frac{1}{c} \ln \left| \tanh \frac{cx}{2} \right|$

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85) $\int \frac{dx}{\cosh cx} = \frac{2}{c} \arctan e^{cx}$

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86) $\int \frac{dx}{\sinh^n cx} = \frac{\cosh cx}{c(n-1)\sinh^{n-1} cx} - \frac{n-2}{n-1} \int \frac{dx}{\sinh^{n-2} cx} \qquad (\text{para } n \neq 1)$

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87) $\int \frac{dx}{\cosh^n cx} = \frac{\sinh cx}{c(n-1)\cosh^{n-1} cx} + \frac{n-2}{n-1} \int \frac{dx}{\cosh^{n-2} cx} \qquad (\text{para } n \neq 1)$

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88) $\int \frac{\cosh^n cx}{\sinh^m cx} dx = \frac{\cosh^{n-1} cx}{c(n-m)\sinh^{m-1} cx} + \frac{n-1}{n-m} \int \frac{\cosh^{n-2} cx}{\sinh^m cx} dx \qquad (\text{para } m \neq n)$

89) $$\int \frac{\sinh^m cx}{\cosh^n cx} dx = \frac{\sinh^{m-1} cx}{c(m-n)\cosh^{n-1} cx} + \frac{m-1}{m-n} \int \frac{\sinh^{m-2} cx}{\cosh^n cx} dx \qquad (\text{para } m \neq n)$$

90) $$\int x \sinh cx \, dx = \frac{1}{c} x \cosh cx - \frac{1}{c^2} \sinh cx$$

91) $$\int x \cosh cx \, dx = \frac{1}{c} x \sinh cx - \frac{1}{c^2} \cosh cx$$

92) $$\int \tanh cx \, dx = \frac{1}{c} \ln |\cosh cx|$$

93) $$\int \coth cx \, dx = \frac{1}{c} \ln |\sinh cx|$$

94) $$\int \tanh^n cx \, dx = -\frac{1}{c(n-1)} \tanh^{n-1} cx + \int \tanh^{n-2} cx \, dx \qquad (\text{para } n \neq 1)$$

95) $$\int \coth^n cx \, dx = -\frac{1}{c(n-1)} \coth^{n-1} cx + \int \coth^{n-2} cx \, dx \qquad (\text{para } n \neq 1)$$

96) $$\int \sinh bx \sinh cx \, dx = \frac{1}{b^2 - c^2}(b \sinh cx \cosh bx - c \cosh cx \sinh bx) \qquad (\text{para } b^2 \neq c^2)$$

97) $$\int \cosh bx \cosh cx \, dx = \frac{1}{b^2 - c^2}(b \sinh bx \cosh cx - c \sinh cx \cosh bx) \qquad (\text{para } b^2 \neq c^2)$$

98) $$\int \cosh bx \sinh cx \, dx = \frac{1}{b^2 - c^2}(b \sinh bx \sinh cx - c \cosh bx \cosh cx) \qquad (\text{para } b^2 \neq c^2)$$

99) $$\int \sinh(ax + b) \sin(cx + d) \, dx = \frac{a}{a^2 + c^2} \cosh(ax + b) \sin(cx + d) - \frac{c}{a^2 + c^2} \sinh(ax + b) \cos(cx + d)$$

100) $$\int \sinh(ax + b) \cos(cx + d) \, dx = \frac{a}{a^2 + c^2} \cosh(ax + b) \cos(cx + d) + \frac{c}{a^2 + c^2} \sinh(ax + b) \sin(cx + d)$$

101) $$\int \cosh(ax + b) \sin(cx + d) \, dx = \frac{a}{a^2 + c^2} \sinh(ax + b) \sin(cx + d) - \frac{c}{a^2 + c^2} \cosh(ax + b) \cos(cx + d)$$

102) $$\int \cosh(ax + b) \cos(cx + d) \, dx = \frac{a}{a^2 + c^2} \sinh(ax + b) \cos(cx + d) + \frac{c}{a^2 + c^2} \cosh(ax + b) \sin(cx + d)$$