ANÁLISIS MATEMÁTICO "A"

Tabla de identidades, infinitésimos, derivadas e integrales

FACULTAD DE INGENIERÍA

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DERIVADAS $[u = u(x)]$

1. $a' = 0$
2. $(a.u)' = a.u'$
3. $(u^n)' = n.u^{n-1}.u'$
4. $(a^u)' = a^u.\ln a\,.u'$
5. $(e^u)' = e^u.u'$
6. $(\ln u)' = \frac{1}{u}.u'$
7. $(\text{sen}\,u)' = \cos(u)\,.u'$
8. $(\cos u)' = -\text{sen}(u).u'$
9. $(\tan u)' = \sec^2(u).u'$
10. $(\sec u)' = \sec u.\tan u.u'$
11. $(\text{cosec}\,u)' = -\text{cosec}\,u.\text{cotan}\,u.u'$
12. $(\text{cotan}\,u)' = -\text{cosec}^2(u).u'$
13. $(\text{arcsen}\,u)' = \frac{1}{\sqrt{1-u^2}}.u'$
14. $(\arccos u)' = \frac{-1}{\sqrt{1-u^2}}.u'$
15. $(\arctan u)' = \frac{1}{1+u^2}.u'$
16. $(\text{arcsec}\,u)' = \frac{1}{|u|.\sqrt{u^2-1}}.u'$
17. $(\text{arccosec}\,u)' = \frac{-1}{|u|.\sqrt{u^2-1}}.u'$
18. $(\text{arccotan}\,u)' = \frac{-1}{1+u^2}.u'$
19. $(\text{sh}\,u)' = \text{ch}(u)\,.u'$
20. $(\text{ch}\,u)' = \text{sh}(u)\,.u'$

INTEGRALES (agregar $+c$)

1. $\int a.dx = ax$
2. $\int x^n.dx = \frac{x^{n+1}}{n+1}$
3. $\int x^{-1}.dx = \ln|x|$
4. $\int a^x.dx = \frac{a^x}{\ln a}$
5. $\int e^x.dx = e^x$
6. $\int \ln x\,.dx = x.(\ln|x| - 1)$
7. $\int \text{sen}x.dx = -\cos x$
8. $\int \cos x\,.dx = \text{sen}x$
9. $\int \tan x\,.dx = -\ln|\cos x|$
10. $\int \sec^2 x\,.dx = \tan x$
11. $\int \text{cosec}^2\,x\,.dx = -\text{cotan}\,x$
12. $\int \sec x\,.dx = \ln|\sec x + \tan x|$
13. $\int \text{cosec}\,x\,.dx = \ln|\text{cosec}\,x - \text{cotan}\,x|$
14. $\int \text{cotan}\,x\,.dx = \ln|\text{sen}\,x|$
15. $\int \text{sh}\,x\,.dx = \text{ch}\,x$
16. $\int \text{ch}\,x\,.dx = \text{sh}\,x$
17. $\int \frac{1}{x^2+a^2}.dx = \frac{1}{a}\arctan\left(\frac{x}{a}\right)$
18. $\int \frac{1}{x^2-a^2}.dx = \frac{1}{2a}\ln\left|\frac{x-a}{x+a}\right|$
19. $\int \frac{1}{\sqrt{x^2\pm a^2}}.dx = \ln\left|x + \sqrt{x^2 \pm a^2}\right|$
20. $\int \frac{1}{\sqrt{a^2-x^2}}.dx = \text{arcsen}\left(\frac{x}{a}\right)$
21. $\int \sqrt{a^2-x^2}.dx = \frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\text{arcsen}\left(\frac{x}{a}\right)$
22. $\int \sqrt{x^2 \pm a^2}.dx = \frac{x}{2}.\sqrt{x^2 \pm a^2} \pm \frac{a^2}{2}\ln\left|x + \sqrt{x^2 \pm a^2}\right|$
22. $\int \text{sen}(px)\cos(qx)\,.dx = \frac{-\cos(p-q)x}{2(p-q)} - \frac{\cos(p+q)x}{2(p+q)}$
23. $\int \text{sen}(px)\text{sen}(qx).dx = \frac{\text{sen}(p-q)x}{2(p-q)} - \frac{\text{sen}(p+q)x}{2(p+q)}$
24. $\int \cos(px)\cos(qx).dx = \frac{\text{sen}(p-q)x}{2(p-q)} + \frac{\text{sen}(p+q)x}{2(p+q)}$

Sean $P = ax^2 + bx + c$ y $\Delta = b^2 - 4ac$

25. $\int \frac{1}{P}.dx = \begin{cases} \frac{2}{\sqrt{-\Delta}}\arctan\left(\frac{2ax+b}{\sqrt{-\Delta}}\right) & si\ \Delta < 0 \\ \frac{1}{\sqrt{\Delta}}\ln\left|\frac{2ax+b-\sqrt{\Delta}}{2ax+b+\sqrt{\Delta}}\right| & si\ \Delta > 0 \end{cases}$
26. $\int \frac{1}{\sqrt{P}}.dx = \begin{cases} \frac{1}{\sqrt{a}}\ln\left(\sqrt{P} + \frac{2ax+b}{2\sqrt{a}}\right) & si\ a > 0 \\ -\frac{1}{\sqrt{-a}}\text{arcsen}\left(\frac{2ax+b}{\sqrt{\Delta}}\right) & si\ a < 0 \end{cases}$
27. $\int \sqrt{P}.dx = \frac{(2ax+b)\sqrt{P}}{4a} + \frac{4ac-b^2}{8a}\int \frac{1}{\sqrt{P}}.dx$

Regla del producto: $(u.v)' = u'.v + u.v'$

Regla del cociente: $\left(\frac{u}{v}\right)' = \frac{u'.v - u.v'}{v^2}$

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IDENTIDADES TRIGONOMÉTRICAS

1. $\text{sen}(x+y) = \text{sen}x.\cos y + \cos x.\text{sen}y$
2. $\cos(x+y) = \cos x.\cos y - \text{sen}x.\text{sen}y$
3. $\text{sen}(2x) = 2\text{sen}x.\cos x$
4. $\cos(2x) = \cos^2 x - \text{sen}^2 x$
5. $\text{sen}x - \text{sen}y = 2\cos\left(\frac{x+y}{2}\right).\text{sen}\left(\frac{x-y}{2}\right)$
6. $\cos x - \cos y = -2\text{sen}\left(\frac{x+y}{2}\right).\text{sen}\left(\frac{x-y}{2}\right)$
7. $\text{sen}^2 x = \frac{1}{2}(1-\cos 2x)$
8. $\cos^2 x = \frac{1}{2}(1+\cos 2x)$
9. $\text{sen}x.\text{sen}y = \frac{1}{2}[\cos(x-y) - \cos(x+y)]$
10. $\text{sen}x.\cos y = \frac{1}{2}[\text{sen}(x-y) + \text{sen}(x+y)]$
11. $\cos x.\cos y = \frac{1}{2}[\cos(x-y) + \cos(x+y)]$

INFINITÉSIMOS EQUIVALENTES [con $\alpha(x) \to 0$]

1. $\text{sen}[\alpha(x)] \sim \alpha(x)$
2. $\tan[\alpha(x)] \sim \alpha(x)$
3. $\text{arcsen}[\alpha(x)] \sim \alpha(x)$
4. $\arctan[\alpha(x)] \sim \alpha(x)$
5. $1 - \cos[\alpha(x)] \sim \frac{[\alpha(x)]^2}{2}$
6. $k^{\alpha(x)} - 1 \sim \alpha(x).\ln k \ \ (k > 0)$
7. $\ln[1+\alpha(x)] \sim \alpha(x)$
8. $\sqrt[n]{1+\alpha(x)} - 1 \sim \frac{\alpha(x)}{n}$
9. $\text{sh}[\alpha(x)] \sim \alpha(x)$
10. $\text{th}[\alpha(x)] \sim \alpha(x)$
11. $\text{ch}[\alpha(x)] - 1 \sim \frac{[\alpha(x)]^2}{2}$