AM 3C – Apendice

Felipe B. Pinto 71951 – EQB

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1 Identidades Trigonométricas

$$\sin^2(x) + \cos^2(x) = 1 \quad (1)$$

$$1 + \tan^2(x) = \sec^2(x) \quad (2)$$

$$1 + \cot^2(x) = \csc^2(x) \quad (3)$$

$$\sin^2(x) = \frac{1 - \cos(2\,x)}{2} \quad (4)$$

$$\cos^2(x) = \frac{1 + \cos(2\,x)}{2} \quad (5)$$

$$\sin(2x) = 2\sin(x)\,\cos(x) \quad (6)$$

$$2\,\sin(x)\,\cos(y) = \sin(x - y) + \sin(x + y) \quad (7)$$

$$2\,\sin(x)\,\sin(y) = \cos(x - y) - \cos(x + y) \quad (8)$$

$$\cos(x)\,\cos(y) = \cos(x - y) + \cos(x + 1) \quad (9)$$

$$1 \pm \sin(x) = 1 \pm \cos(\pi/2 - x) \quad (10)$$

2 Trigonometria Hiperbólica

$$\sinh(x) = \frac{e^x - e^{-x}}{2} \tag{11}$$

$$\cosh(x) = \frac{e^x + e^{-x}}{2} \tag{12}$$

$$\tanh(x) = \frac{\sinh(x)}{\cosh(x)} = \frac{e^x - e^{-x}}{e^x + e^{-x}} \tag{13}$$

$$\coth(x) = 1/\tanh(x) \tag{14}$$

$$\operatorname{sech}(x) = 1/\cosh(x) \tag{15}$$

$$\operatorname{csch}(x) = 1/\sinh(x) \tag{16}$$

3 Tabela de Derivadas

Basic

$$(u^n)' = n\,u^{n-1}\,u' \tag{17}$$
$$(u\ \ v)' = \ \ u'\,v + v'\,u \tag{18}$$
$$(u/v)' = (u'\,v - v'\,u)\,/v^2 \tag{19}$$

Exponentials

$$(a^u)' = a^u\,\ln(a)\,u'; \qquad (a > 0 \wedge a \neq 1) \tag{20}$$
$$(e^u)' = e^u\,u' \tag{21}$$
$$\log_a'(u) = \frac{u'}{u}\,\log_a(e) \tag{22}$$
$$\ln'(u) = \frac{1}{u}\,u' \tag{23}$$
$$(u^v)' = v\,u^{v-1}\,u' + u^v\,\ln(u)\,v' \tag{24}$$

Trigonométric

$$\sin'(u) = \ \ u'\,\cos(u) \tag{25}$$
$$\cos'(u) = -u'\,\sin(u) \tag{26}$$
$$\tan'(u) = \ \ u'\,\sec^2(u) \tag{27}$$
$$\cot'(u) = -u'\,\csc^2(u) \tag{28}$$
$$\sec'(u) = \ \ u'\,\sec(u)\,\tan(u) \tag{29}$$
$$\csc'(u) = -u'\,\csc(u)\,\cot(u) \tag{30}$$

Hyperbolic

$$\sinh'(u) = \cosh(u) \tag{31}$$
$$\cosh'(u) = \sinh(u) \tag{32}$$
$$\tanh'(u) = 1 - \tanh^2(u) \tag{33}$$
$$\coth'(u) = 1 - \coth^2(u) \tag{34}$$
$$\operatorname{sech}'(u) = -\tanh(u)\,\operatorname{sech}(u) \tag{35}$$
$$\operatorname{csch}'(u) = -\coth(u)\,\operatorname{csch}(u) \tag{36}$$

Arcs

$$\arcsin'(u) = \ \ \frac{u'}{\sqrt{1-u^2}} \tag{37}$$
$$\arccos'(u) = -\frac{u'}{\sqrt{1-u^2}} \tag{38}$$
$$\arctan'(u) = \ \ \frac{u'}{1+u^2} \tag{39}$$
$$\operatorname{arccot}'(u) = -\frac{u'}{1+u^2} \tag{40}$$
$$\operatorname{arcsec}'(u) = \ \ \frac{u'}{|u|\,\sqrt{u^2-1}}; (|u| > 1) \tag{41}$$
$$\operatorname{arccsc}'(u) = -\frac{u'}{|u|\,\sqrt{u^2-1}}; (|u| > 1) \tag{42}$$

4 Tabela de Integrais

Basics

$$\int \mathrm{d}u = c + u \tag{43}$$

$$\int u^n \,\mathrm{d}u = c + \frac{u^{n+1}}{n+1}; \qquad (n \neq -1) \tag{44}$$

$$\int \mathrm{d}u/u = c + \ln|u| \tag{45}$$

$$\int a^u \,\mathrm{d}u = c + \frac{a^u}{\ln a}; \qquad (a > 0 \wedge a \neq 1) \tag{46}$$

$$\int e^u \,\mathrm{d}u = c + e^u \tag{47}$$

trigonometric

$$\int \sin(u)\ \mathrm{d}u = c - \cos u \tag{48}$$

$$\int \cos(u)\ \mathrm{d}u = c + \sin u \tag{49}$$

$$\int \tan(u)\ \mathrm{d}u = c + \ln|\sec(u)| \tag{50}$$

$$\int \cot(u)\ \mathrm{d}u = c + \ln|\sin(u)| \tag{51}$$

$$\int \sec(u)\ \mathrm{d}u = c + \ln|\sec(u) + \tan(u)| \tag{52}$$

$$\int \csc(u)\ \mathrm{d}u = c + \ln|\csc(u) - \cot(u)| \tag{53}$$

$$\int \sec(u)\ \tan(u)\ \mathrm{d}u = c + \sec(u) \tag{54}$$

$$\int \csc(u)\ \cot(u)\ \mathrm{d}u = c - \csc(u) \tag{55}$$

$$\int \sec^2(u)\ \mathrm{d}u = c + \tan(u) \tag{56}$$

$$\int \csc^2(u)\ \mathrm{d}u = c - \cot(u) \tag{57}$$

expressions

$$\int \mathrm{d}u/(u^2 + a^2) = \arctan(u/a)/a + c \tag{58}$$

$$\int \mathrm{d}u/(u^2 - a^2) = \ln\left|\frac{u-a}{u+a}\right|/2\,a + c; \qquad (u^2 > a^2) \tag{59}$$

$$\int \mathrm{d}u/\sqrt{u^2 + a^2} = \ln|u + \sqrt{u^2 + a^2}| + c \tag{60}$$

$$\int \mathrm{d}u/\sqrt{u^2 - a^2} = \arcsin(u/a) + c; \qquad (u^2 < a^2) \tag{61}$$

$$\int \mathrm{d}u/\sqrt{a^2 - u^2} = \arcsin(u/a) + c; \qquad (u^2 < a^2) \tag{62}$$

$$\int \mathrm{d}u/\left(u\sqrt{a^2 - u^2}\right) = \operatorname{arcsec}|u/a|/a + c \tag{63}$$

Uncommon Integrals

$$\int \sin^n(a\,u)\ \mathrm{d}u = -\frac{\sin^{n-1}(a\,u)\ \cos(a\,u)}{a\,n} + \frac{n-1}{n}\int \sin^{n-2}(a\,u)\ \mathrm{d}u \tag{64}$$

$$\int \cos^n(a\,u)\ \mathrm{d}u = \frac{\sin(a\,u)\ \cos^{n-1}(a\,u)}{a\,n} + \frac{n-1}{n}\int \cos^{n-2}(a\,u)\ \mathrm{d}u \tag{65}$$

$$\int \tan^n(a\,u)\ \mathrm{d}u = \frac{\tan^{n-1}(a\,u)}{a(n-1)} - \int \tan^{n-2}(a\,u)\ \mathrm{d}u \tag{66}$$

$$\int \cot^n(a\,u)\ \mathrm{d}u = -\frac{\cot^{n-1}(a\,u)}{a(n-1)} - \int \cot^{n-2}(a\,u)\ \mathrm{d}u \tag{67}$$

$$\int \sec^n(a\,u)\ \mathrm{d}u = \frac{\sec^{n-2}(a\,u)\tan(a\,u)}{a\,(n-1)} + \frac{n-2}{n-1}\int \sec^{n-2}(a\,u)\ \mathrm{d}u \tag{68}$$

$$\int \csc^n(a\,u)\ \mathrm{d}u = -\frac{\csc^{n-2}(a\,u)\cot(a\,u)}{a\,(n-1)} + \frac{n-2}{n-1}\int \csc^{n-2}(a\,u)\ \mathrm{d}u \tag{69}$$

Indefinite Integral Rules

$$P(u\,v') = u\,v - P(u'\,v) \tag{70}$$

$$P(f(g(x))\,g'(x)) = P(f(u)\ \mathrm{d}u); \quad u = g(x) \tag{71}$$