

## ÁLGEBRA

### OPERACIONES ARITMÉTICAS

$$a(b + c) = ab + ac$$

$$\frac{a + c}{b} = \frac{a}{b} + \frac{c}{b}$$

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$$

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$$

### EXPONENTES Y RADICALES

$$x^m x^n = x^{m+n}$$

$$(x^m)^n = x^{mn}$$

$$(xy)^n = x^n y^n$$

$$x^{1/n} = \sqrt[n]{x}$$

$$\sqrt[n]{xy} = \sqrt[n]{x} \sqrt[n]{y}$$

$$\frac{x^m}{x^n} = x^{m-n}$$

$$x^{-n} = \frac{1}{x^n}$$

$$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$$

$$x^{m/n} = \sqrt[n]{x^m} = (\sqrt[n]{x})^m$$

$$\sqrt[n]{\frac{x}{y}} = \frac{\sqrt[n]{x}}{\sqrt[n]{y}}$$

### FACTORIZACIÓN ESPECIAL DE POLINOMIOS

$$x^2 - y^2 = (x + y)(x - y)$$

$$x^3 + y^3 = (x + y)(x^2 - xy + y^2)$$

$$x^3 - y^3 = (x - y)(x^2 + xy + y^2)$$

### TEOREMA DEL BINOMIO

$$(x + y)^2 = x^2 + 2xy + y^2 \quad (x - y)^2 = x^2 - 2xy + y^2$$

$$(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

$$(x - y)^3 = x^3 - 3x^2y + 3xy^2 - y^3$$

$$(x + y)^n = x^n + nx^{n-1}y + \frac{n(n-1)}{2}x^{n-2}y^2$$

$$+ \dots + \binom{n}{k}x^{n-k}y^k + \dots + nx^{n-1}y + y^n$$

$$\text{donde } \binom{n}{k} = \frac{n(n-1) \dots (n-k+1)}{1 \cdot 2 \cdot 3 \dots k}$$

### FÓRMULA CUADRÁTICA

$$\text{Si } ax^2 + bx + c = 0, \text{ entonces } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

### DESIGUALDADES Y VALOR ABSOLUTO

Si  $a < b$  y  $b < c$ , entonces  $a < c$ .

Si  $a < b$ , entonces  $a + c < b + c$ .

Si  $a < b$  y  $c > 0$ , entonces  $ca < cb$ .

Si  $a < b$  y  $c < 0$ , entonces  $ca > cb$ .

Si  $a > 0$ , entonces

$$|x| = a \text{ significa } x = a \text{ o } x = -a$$

$$|x| < a \text{ significa } -a < x < a$$

$$|x| > a \text{ significa } x > a \text{ o } x < -a$$

## GEOMETRÍA

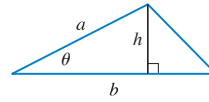
### FÓRMULAS GEOMÉTRICAS

Fórmulas para área  $A$ , circunferencia  $C$  y volumen  $V$ :

Triángulo

$$A = \frac{1}{2}bh$$

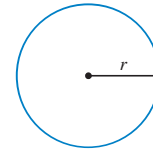
$$= \frac{1}{2}ab \sin \theta$$



Círculo

$$A = \pi r^2$$

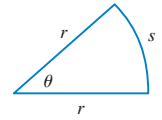
$$C = 2\pi r$$



Sector circular

$$A = \frac{1}{2}r^2\theta$$

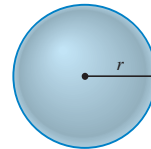
$$s = r\theta \text{ (}\theta \text{ en radianes)}$$



Esfera

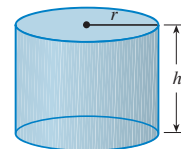
$$V = \frac{4}{3}\pi r^3$$

$$A = 4\pi r^2$$



Cilindro

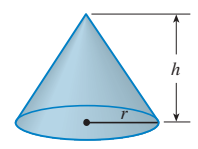
$$V = \pi r^2 h$$



Cono

$$V = \frac{1}{3}\pi r^2 h$$

$$A = \pi r \sqrt{r^2 + h^2}$$



### FÓRMULAS DE DISTANCIA Y PUNTO MEDIO

Distancia entre  $P_1(x_1, y_1)$  y  $P_2(x_2, y_2)$ :

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Punto medio de  $\overline{P_1P_2}$ :  $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

### LÍNEAS

Pendiente de la línea a través de  $P_1(x_1, y_1)$  y  $P_2(x_2, y_2)$ :

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Ecuación punto-pendiente de la línea a través de  $P_1(x_1, y_1)$  con pendiente  $m$ :

$$y - y_1 = m(x - x_1)$$

Ecuación de la pendiente y la intersección de la línea con pendiente  $m$  e intersección de  $y$  en  $b$

$$y = mx + b$$

### CÍRCULOS

Ecuación de círculo con centro  $(h, k)$  y radio  $r$ :

$$(x - h)^2 + (y - k)^2 = r^2$$

## TRIGONOMETRÍA

### MEDICIÓN DE ÁNGULOS

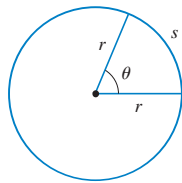
$$\pi \text{ radianes} = 180^\circ$$

$$1^\circ = \frac{\pi}{180} \text{ rad}$$

$$1 \text{ rad} = \frac{180^\circ}{\pi}$$

$$s = r\theta$$

( $\theta$  en radianes)



### TRIGONOMETRÍA ÁNGULO RECTO

$$\sin \theta = \frac{\text{op}}{\text{hip}}$$

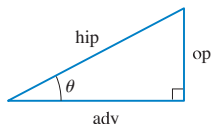
$$\csc \theta = \frac{\text{hip}}{\text{op}}$$

$$\cos \theta = \frac{\text{ady}}{\text{hip}}$$

$$\sec \theta = \frac{\text{hip}}{\text{ady}}$$

$$\tan \theta = \frac{\text{op}}{\text{ady}}$$

$$\cot \theta = \frac{\text{ady}}{\text{op}}$$



### FUNCIONES TRIGONOMÉTRICAS

$$\sin \theta = \frac{y}{r}$$

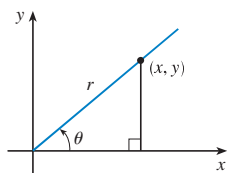
$$\csc \theta = \frac{r}{y}$$

$$\cos \theta = \frac{x}{r}$$

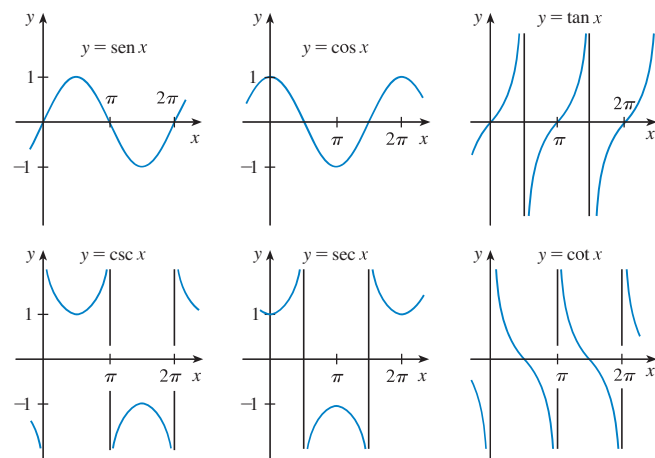
$$\sec \theta = \frac{r}{x}$$

$$\tan \theta = \frac{y}{x}$$

$$\cot \theta = \frac{x}{y}$$



### GRÁFICAS DE FUNCIONES TRIGONOMÉTRICAS



### FUNCIONES TRIGONOMÉTRICAS DE ÁNGULOS IMPORTANTES

| $\theta$   | radianes | $\sin \theta$ | $\cos \theta$ | $\tan \theta$ |
|------------|----------|---------------|---------------|---------------|
| $0^\circ$  | 0        | 0             | 1             | 0             |
| $30^\circ$ | $\pi/6$  | $1/2$         | $\sqrt{3}/2$  | $\sqrt{3}/3$  |
| $45^\circ$ | $\pi/4$  | $\sqrt{2}/2$  | $\sqrt{2}/2$  | 1             |
| $60^\circ$ | $\pi/3$  | $\sqrt{3}/2$  | $1/2$         | $\sqrt{3}$    |
| $90^\circ$ | $\pi/2$  | 1             | 0             | —             |

### IDENTIDADES FUNDAMENTALES

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$1 + \tan^2 \theta = \sec^2 \theta$$

$$1 + \cot^2 \theta = \csc^2 \theta$$

$$\sin(-\theta) = -\sin \theta$$

$$\cos(-\theta) = \cos \theta$$

$$\tan(-\theta) = -\tan \theta$$

$$\sin\left(\frac{\pi}{2} - \theta\right) = \cos \theta$$

$$\cos\left(\frac{\pi}{2} - \theta\right) = \sin \theta$$

$$\tan\left(\frac{\pi}{2} - \theta\right) = \cot \theta$$

### LEY DE LOS SENOS

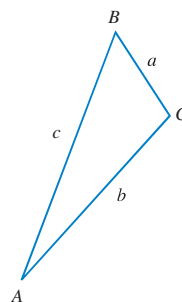
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

### LEY DE LOS COSENOS

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$



### FÓRMULAS DE SUMA Y RESTA

$$\sin(x + y) = \sin x \cos y + \cos x \sin y$$

$$\sin(x - y) = \sin x \cos y - \cos x \sin y$$

$$\cos(x + y) = \cos x \cos y - \sin x \sin y$$

$$\cos(x - y) = \cos x \cos y + \sin x \sin y$$

$$\tan(x + y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$$

$$\tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$$

### FÓRMULAS DE ÁNGULOS DOBLES

$$\sin 2x = 2 \sin x \cos x$$

$$\cos 2x = \cos^2 x - \sin^2 x = 2 \cos^2 x - 1 = 1 - 2 \sin^2 x$$

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

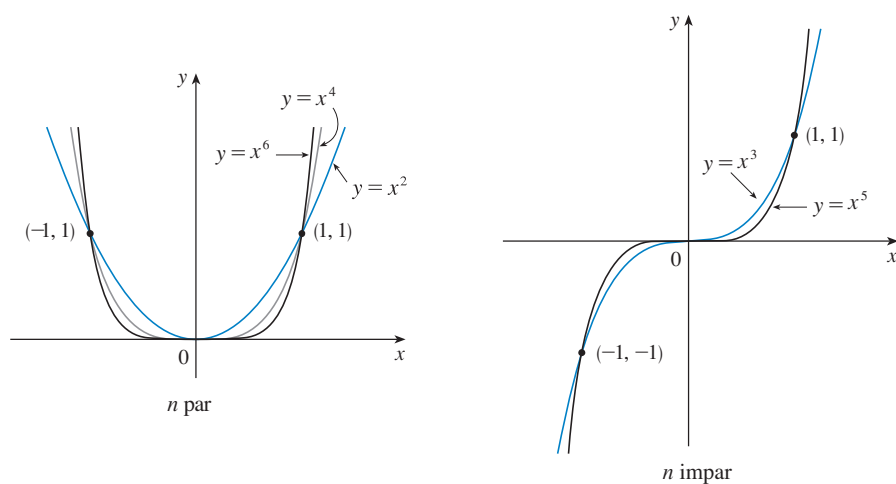
### FÓRMULAS DE MEDIOS ÁNGULOS

$$\sin^2 x = \frac{1 - \cos 2x}{2} \quad \cos^2 x = \frac{1 + \cos 2x}{2}$$

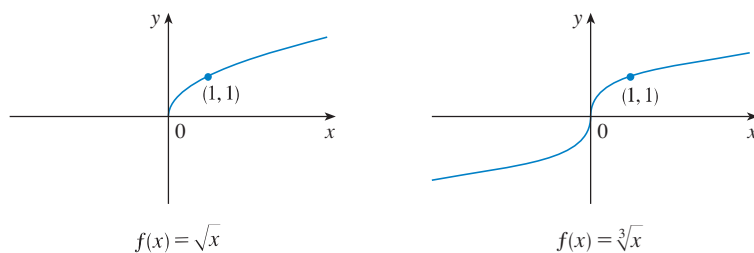
## FUNCIONES ESPECIALES

### FUNCIONES DE POTENCIAS $f(x) = x^a$

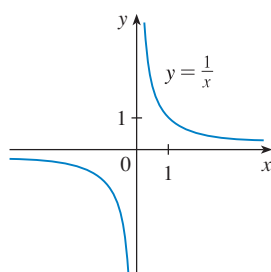
(i)  $f(x) = x^n$ ,  $n$  es entero positivo



(ii)  $f(x) = x^{1/n} = \sqrt[n]{x}$ ,  $n$  es entero positivo



(iii)  $f(x) = x^{-1} = \frac{1}{x}$

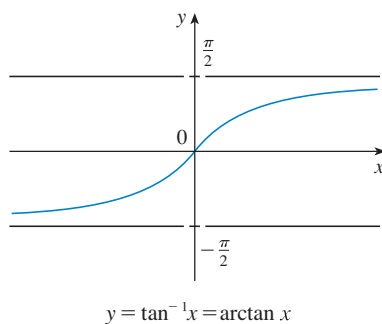


### FUNCIONES TRIGONOMÉTRICAS INVERSAS

$$\arcsen x = \sin^{-1}x = y \iff \sin y = x \quad y \quad -\frac{\pi}{2} \leq y \leq \frac{\pi}{2}$$

$$\arccos x = \cos^{-1}x = y \iff \cos y = x \quad y \quad 0 \leq y \leq \pi$$

$$\arctan x = \tan^{-1}x = y \iff \tan y = x \quad y \quad -\frac{\pi}{2} < y < \frac{\pi}{2}$$



$$\lim_{x \rightarrow -\infty} \tan^{-1}x = -\frac{\pi}{2}$$

$$\lim_{x \rightarrow \infty} \tan^{-1}x = \frac{\pi}{2}$$

## FUNCIONES ESPECIALES

### FUNCIONES EXPONENCIALES Y LOGARÍTMICAS

$$\log_a x = y \iff a^y = x$$

$$\ln x = \log_e x, \text{ donde } \ln e = 1$$

$$\ln x = y \iff e^y = x$$

#### Ecuaciones de cancelación

$$\log_a(a^x) = x \quad a^{\log_a x} = x$$

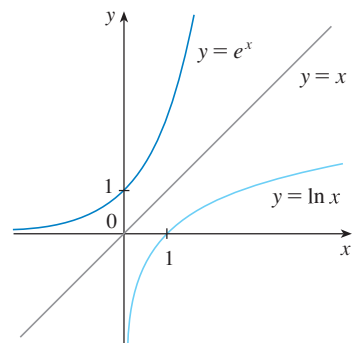
$$\ln(e^x) = x \quad e^{\ln x} = x$$

#### Leyes de los logaritmos

$$1. \log_a(xy) = \log_a x + \log_a y$$

$$2. \log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$$

$$3. \log_a(x^r) = r \log_a x$$

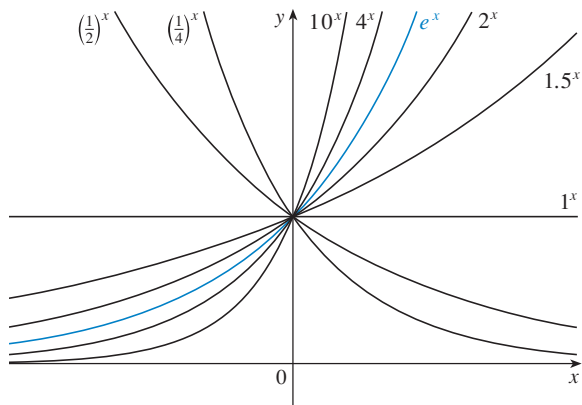


$$\lim_{x \rightarrow -\infty} e^x = 0$$

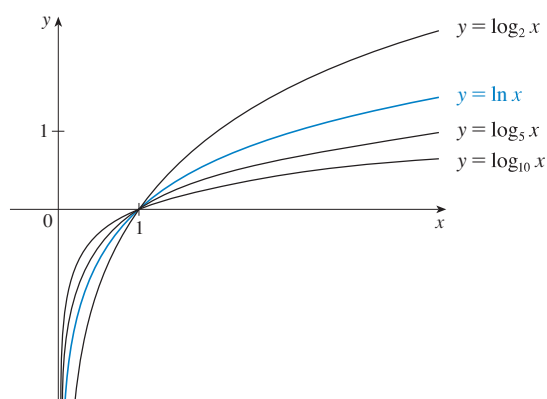
$$\lim_{x \rightarrow \infty} e^x = \infty$$

$$\lim_{x \rightarrow 0^+} \ln x = -\infty$$

$$\lim_{x \rightarrow \infty} \ln x = \infty$$



Funciones exponenciales



Funciones logarítmicas

### FUNCIONES HIPERBÓLICAS

$$\sinh x = \frac{e^x - e^{-x}}{2}$$

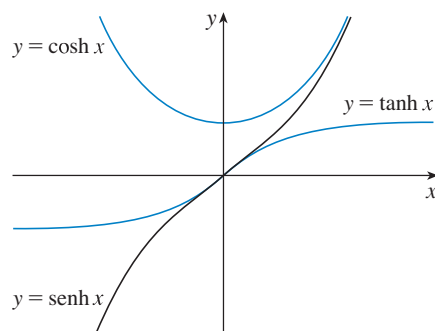
$$\operatorname{csch} x = \frac{1}{\sinh x}$$

$$\cosh x = \frac{e^x + e^{-x}}{2}$$

$$\operatorname{sech} x = \frac{1}{\cosh x}$$

$$\tanh x = \frac{\sinh x}{\cosh x}$$

$$\operatorname{coth} x = \frac{\cosh x}{\sinh x}$$



### FUNCIONES HIPERBÓLICAS INVERSAS

$$y = \sinh^{-1} x \iff \sinh y = x$$

$$\sinh^{-1} x = \ln(x + \sqrt{x^2 + 1})$$

$$y = \cosh^{-1} x \iff \cosh y = x \quad y \geq 0$$

$$\cosh^{-1} x = \ln(x + \sqrt{x^2 - 1})$$

$$y = \tanh^{-1} x \iff \tanh y = x$$

$$\tanh^{-1} x = \frac{1}{2} \ln\left(\frac{1+x}{1-x}\right)$$

## REGLAS DE DIFERENCIACIÓN

### FÓRMULAS GENERALES

1.  $\frac{d}{dx}(c) = 0$
2.  $\frac{d}{dx}[cf(x)] = cf'(x)$
3.  $\frac{d}{dx}[f(x) + g(x)] = f'(x) + g'(x)$
4.  $\frac{d}{dx}[f(x) - g(x)] = f'(x) - g'(x)$
5.  $\frac{d}{dx}[f(x)g(x)] = f(x)g'(x) + g(x)f'(x)$  (Regla del producto)
6.  $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$  (Regla del cociente)
7.  $\frac{d}{dx}f(g(x)) = f'(g(x))g'(x)$  (Regla de la cadena)
8.  $\frac{d}{dx}(x^n) = nx^{n-1}$  (Regla de potencias)

### FUNCIONES EXPONENCIALES Y LOGARÍTMICAS

9.  $\frac{d}{dx}(e^x) = e^x$
10.  $\frac{d}{dx}(a^x) = a^x \ln a$
11.  $\frac{d}{dx} \ln |x| = \frac{1}{x}$
12.  $\frac{d}{dx}(\log_a x) = \frac{1}{x \ln a}$

### FUNCIONES TRIGONOMÉTRICAS

13.  $\frac{d}{dx}(\sin x) = \cos x$
14.  $\frac{d}{dx}(\cos x) = -\sin x$
15.  $\frac{d}{dx}(\tan x) = \sec^2 x$
16.  $\frac{d}{dx}(\csc x) = -\csc x \cot x$
17.  $\frac{d}{dx}(\sec x) = \sec x \tan x$
18.  $\frac{d}{dx}(\cot x) = -\csc^2 x$

### FUNCIONES TRIGONOMÉTRICAS INVERSAS

19.  $\frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$
20.  $\frac{d}{dx}(\cos^{-1} x) = -\frac{1}{\sqrt{1-x^2}}$
21.  $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$
22.  $\frac{d}{dx}(\csc^{-1} x) = -\frac{1}{x\sqrt{x^2-1}}$
23.  $\frac{d}{dx}(\sec^{-1} x) = \frac{1}{x\sqrt{x^2-1}}$
24.  $\frac{d}{dx}(\cot^{-1} x) = -\frac{1}{1+x^2}$

### FUNCIONES HIPERBÓLICAS

25.  $\frac{d}{dx}(\sinh x) = \cosh x$
26.  $\frac{d}{dx}(\cosh x) = \sinh x$
27.  $\frac{d}{dx}(\tanh x) = \operatorname{sech}^2 x$
28.  $\frac{d}{dx}(\operatorname{csch} x) = -\operatorname{csch} x \coth x$
29.  $\frac{d}{dx}(\operatorname{sech} x) = -\operatorname{sech} x \tanh x$
30.  $\frac{d}{dx}(\coth x) = -\operatorname{csch}^2 x$

### FUNCIONES HIPERBÓLICAS INVERSAS

31.  $\frac{d}{dx}(\sinh^{-1} x) = \frac{1}{\sqrt{1+x^2}}$
32.  $\frac{d}{dx}(\cosh^{-1} x) = \frac{1}{\sqrt{x^2-1}}$
33.  $\frac{d}{dx}(\tanh^{-1} x) = \frac{1}{1-x^2}$
34.  $\frac{d}{dx}(\operatorname{csch}^{-1} x) = -\frac{1}{|x|\sqrt{x^2+1}}$
35.  $\frac{d}{dx}(\operatorname{sech}^{-1} x) = -\frac{1}{x\sqrt{1-x^2}}$
36.  $\frac{d}{dx}(\coth^{-1} x) = \frac{1}{1-x^2}$

TABLA DE INTEGRALES

FORMAS BÁSICAS

1.  $\int u \, dv = uv - \int v \, du$
2.  $\int u^n \, du = \frac{u^{n+1}}{n+1} + C, \quad n \neq -1$
3.  $\int \frac{du}{u} = \ln |u| + C$
4.  $\int e^u \, du = e^u + C$
5.  $\int a^u \, du = \frac{a^u}{\ln a} + C$
6.  $\int \sin u \, du = -\cos u + C$
7.  $\int \cos u \, du = \sin u + C$
8.  $\int \sec^2 u \, du = \tan u + C$
9.  $\int \csc^2 u \, du = -\cot u + C$
10.  $\int \sec u \tan u \, du = \sec u + C$
11.  $\int \csc u \cot u \, du = -\csc u + C$
12.  $\int \tan u \, du = \ln |\sec u| + C$
13.  $\int \cot u \, du = \ln |\sin u| + C$
14.  $\int \sec u \, du = \ln |\sec u + \tan u| + C$
15.  $\int \csc u \, du = \ln |\csc u - \cot u| + C$
16.  $\int \frac{du}{\sqrt{a^2 - u^2}} = \sin^{-1} \frac{u}{a} + C$
17.  $\int \frac{du}{a^2 + u^2} = \frac{1}{a} \tan^{-1} \frac{u}{a} + C$
18.  $\int \frac{du}{u\sqrt{u^2 - a^2}} = \frac{1}{a} \sec^{-1} \frac{u}{a} + C$
19.  $\int \frac{du}{a^2 - u^2} = \frac{1}{2a} \ln \left| \frac{u+a}{u-a} \right| + C$
20.  $\int \frac{du}{u^2 - a^2} = \frac{1}{2a} \ln \left| \frac{u-a}{u+a} \right| + C$

FORMAS QUE INVOLUCRAN  $\sqrt{a^2 + u^2}, a > 0$

21.  $\int \sqrt{a^2 + u^2} \, du = \frac{u}{2} \sqrt{a^2 + u^2} + \frac{a^2}{2} \ln(u + \sqrt{a^2 + u^2}) + C$
22.  $\int u^2 \sqrt{a^2 + u^2} \, du = \frac{u}{8} (a^2 + 2u^2) \sqrt{a^2 + u^2} - \frac{a^4}{8} \ln(u + \sqrt{a^2 + u^2}) + C$
23.  $\int \frac{\sqrt{a^2 + u^2}}{u} \, du = \sqrt{a^2 + u^2} - a \ln \left| \frac{a + \sqrt{a^2 + u^2}}{u} \right| + C$
24.  $\int \frac{\sqrt{a^2 + u^2}}{u^2} \, du = -\frac{\sqrt{a^2 + u^2}}{u} + \ln(u + \sqrt{a^2 + u^2}) + C$
25.  $\int \frac{du}{\sqrt{a^2 + u^2}} = \ln(u + \sqrt{a^2 + u^2}) + C$
26.  $\int \frac{u^2 \, du}{\sqrt{a^2 + u^2}} = \frac{u}{2} \sqrt{a^2 + u^2} - \frac{a^2}{2} \ln(u + \sqrt{a^2 + u^2}) + C$
27.  $\int \frac{du}{u\sqrt{a^2 + u^2}} = -\frac{1}{a} \ln \left| \frac{\sqrt{a^2 + u^2} + a}{u} \right| + C$
28.  $\int \frac{du}{u^2 \sqrt{a^2 + u^2}} = -\frac{\sqrt{a^2 + u^2}}{a^2 u} + C$
29.  $\int \frac{du}{(a^2 + u^2)^{3/2}} = \frac{u}{a^2 \sqrt{a^2 + u^2}} + C$

TABLA DE INTEGRALES

FORMAS QUE INVOLUCRAN  $\sqrt{a^2 - u^2}$ ,  $a > 0$

$$30. \int \sqrt{a^2 - u^2} du = \frac{u}{2} \sqrt{a^2 - u^2} + \frac{a^2}{2} \sin^{-1} \frac{u}{a} + C$$

$$31. \int u^2 \sqrt{a^2 - u^2} du = \frac{u}{8} (2u^2 - a^2) \sqrt{a^2 - u^2} + \frac{a^4}{8} \sin^{-1} \frac{u}{a} + C$$

$$32. \int \frac{\sqrt{a^2 - u^2}}{u} du = \sqrt{a^2 - u^2} - a \ln \left| \frac{a + \sqrt{a^2 - u^2}}{u} \right| + C$$

$$33. \int \frac{\sqrt{a^2 - u^2}}{u^2} du = -\frac{1}{u} \sqrt{a^2 - u^2} - \sin^{-1} \frac{u}{a} + C$$

$$34. \int \frac{u^2 du}{\sqrt{a^2 - u^2}} = -\frac{u}{2} \sqrt{a^2 - u^2} + \frac{a^2}{2} \sin^{-1} \frac{u}{a} + C$$

$$35. \int \frac{du}{u \sqrt{a^2 - u^2}} = -\frac{1}{a} \ln \left| \frac{a + \sqrt{a^2 - u^2}}{u} \right| + C$$

$$36. \int \frac{du}{u^2 \sqrt{a^2 - u^2}} = -\frac{1}{a^2 u} \sqrt{a^2 - u^2} + C$$

$$37. \int (a^2 - u^2)^{3/2} du = -\frac{u}{8} (2u^2 - 5a^2) \sqrt{a^2 - u^2} + \frac{3a^4}{8} \sin^{-1} \frac{u}{a} + C$$

$$38. \int \frac{du}{(a^2 - u^2)^{3/2}} = \frac{u}{a^2 \sqrt{a^2 - u^2}} + C$$

FORMAS QUE INVOLUCRAN  $\sqrt{u^2 - a^2}$ ,  $a > 0$

$$39. \int \sqrt{u^2 - a^2} du = \frac{u}{2} \sqrt{u^2 - a^2} - \frac{a^2}{2} \ln |u + \sqrt{u^2 - a^2}| + C$$

$$40. \int u^2 \sqrt{u^2 - a^2} du = \frac{u}{8} (2u^2 - a^2) \sqrt{u^2 - a^2} - \frac{a^4}{8} \ln |u + \sqrt{u^2 - a^2}| + C$$

$$41. \int \frac{\sqrt{u^2 - a^2}}{u} du = \sqrt{u^2 - a^2} - a \cos^{-1} \frac{a}{|u|} + C$$

$$42. \int \frac{\sqrt{u^2 - a^2}}{u^2} du = -\frac{\sqrt{u^2 - a^2}}{u} + \ln |u + \sqrt{u^2 - a^2}| + C$$

$$43. \int \frac{du}{\sqrt{u^2 - a^2}} = \ln |u + \sqrt{u^2 - a^2}| + C$$

$$44. \int \frac{u^2 du}{\sqrt{u^2 - a^2}} = \frac{u}{2} \sqrt{u^2 - a^2} + \frac{a^2}{2} \ln |u + \sqrt{u^2 - a^2}| + C$$

$$45. \int \frac{du}{u^2 \sqrt{u^2 - a^2}} = \frac{\sqrt{u^2 - a^2}}{a^2 u} + C$$

$$46. \int \frac{du}{(u^2 - a^2)^{3/2}} = -\frac{u}{a^2 \sqrt{u^2 - a^2}} + C$$

TABLA DE INTEGRALES

FORMAS QUE INVOLUCRAN  $a + bu$

47.  $\int \frac{u \, du}{a + bu} = \frac{1}{b^2} (a + bu - a \ln |a + bu|) + C$
48.  $\int \frac{u^2 \, du}{a + bu} = \frac{1}{2b^3} [(a + bu)^2 - 4a(a + bu) + 2a^2 \ln |a + bu|] + C$
49.  $\int \frac{du}{u(a + bu)} = \frac{1}{a} \ln \left| \frac{u}{a + bu} \right| + C$
50.  $\int \frac{du}{u^2(a + bu)} = -\frac{1}{au} + \frac{b}{a^2} \ln \left| \frac{a + bu}{u} \right| + C$
51.  $\int \frac{u \, du}{(a + bu)^2} = \frac{a}{b^2(a + bu)} + \frac{1}{b^2} \ln |a + bu| + C$
52.  $\int \frac{du}{u(a + bu)^2} = \frac{1}{a(a + bu)} - \frac{1}{a^2} \ln \left| \frac{a + bu}{u} \right| + C$
53.  $\int \frac{u^2 \, du}{(a + bu)^2} = \frac{1}{b^3} \left( a + bu - \frac{a^2}{a + bu} - 2a \ln |a + bu| \right) + C$
54.  $\int u \sqrt{a + bu} \, du = \frac{2}{15b^2} (3bu - 2a)(a + bu)^{3/2} + C$
55.  $\int \frac{u \, du}{\sqrt{a + bu}} = \frac{2}{3b^2} (bu - 2a) \sqrt{a + bu} + C$
56.  $\int \frac{u^2 \, du}{\sqrt{a + bu}} = \frac{2}{15b^3} (8a^2 + 3b^2u^2 - 4abu) \sqrt{a + bu} + C$
57.  $\int \frac{du}{u \sqrt{a + bu}} = \frac{1}{\sqrt{a}} \ln \left| \frac{\sqrt{a + bu} - \sqrt{a}}{\sqrt{a + bu} + \sqrt{a}} \right| + C, \quad \text{si } a > 0$   
 $= \frac{2}{\sqrt{-a}} \tan^{-1} \sqrt{\frac{a + bu}{-a}} + C, \quad \text{si } a < 0$
58.  $\int \frac{\sqrt{a + bu}}{u} \, du = 2\sqrt{a + bu} + a \int \frac{du}{u \sqrt{a + bu}}$
59.  $\int \frac{\sqrt{a + bu}}{u^2} \, du = -\frac{\sqrt{a + bu}}{u} + \frac{b}{2} \int \frac{du}{u \sqrt{a + bu}}$
60.  $\int u^n \sqrt{a + bu} \, du = \frac{2}{b(2n + 3)} \left[ u^n(a + bu)^{3/2} - na \int u^{n-1} \sqrt{a + bu} \, du \right]$
61.  $\int \frac{u^n \, du}{\sqrt{a + bu}} = \frac{2u^n \sqrt{a + bu}}{b(2n + 1)} - \frac{2na}{b(2n + 1)} \int \frac{u^{n-1} \, du}{\sqrt{a + bu}}$
62.  $\int \frac{du}{u^n \sqrt{a + bu}} = -\frac{\sqrt{a + bu}}{a(n - 1)u^{n-1}} - \frac{b(2n - 3)}{2a(n - 1)} \int \frac{du}{u^{n-1} \sqrt{a + bu}}$



TABLA DE INTEGRALES

FORMAS TRIGONOMÉTRICAS

63.  $\int \sin^2 u \, du = \frac{1}{2}u - \frac{1}{4}\sin 2u + C$
64.  $\int \cos^2 u \, du = \frac{1}{2}u + \frac{1}{4}\sin 2u + C$
65.  $\int \tan^2 u \, du = \tan u - u + C$
66.  $\int \cot^2 u \, du = -\cot u - u + C$
67.  $\int \sin^3 u \, du = -\frac{1}{3}(2 + \sin^2 u) \cos u + C$
68.  $\int \cos^3 u \, du = \frac{1}{3}(2 + \cos^2 u) \sin u + C$
69.  $\int \tan^3 u \, du = \frac{1}{2}\tan^2 u + \ln |\cos u| + C$
70.  $\int \cot^3 u \, du = -\frac{1}{2}\cot^2 u - \ln |\sin u| + C$
71.  $\int \sec^3 u \, du = \frac{1}{2}\sec u \tan u + \frac{1}{2}\ln |\sec u + \tan u| + C$
72.  $\int \csc^3 u \, du = -\frac{1}{2}\csc u \cot u + \frac{1}{2}\ln |\csc u - \cot u| + C$
73.  $\int \sin^n u \, du = -\frac{1}{n}\sin^{n-1}u \cos u + \frac{n-1}{n}\int \sin^{n-2}u \, du$
74.  $\int \cos^n u \, du = \frac{1}{n}\cos^{n-1}u \sin u + \frac{n-1}{n}\int \cos^{n-2}u \, du$
75.  $\int \tan^n u \, du = \frac{1}{n-1}\tan^{n-1}u - \int \tan^{n-2}u \, du$
76.  $\int \cot^n u \, du = \frac{-1}{n-1}\cot^{n-1}u - \int \cot^{n-2}u \, du$
77.  $\int \sec^n u \, du = \frac{1}{n-1}\tan u \sec^{n-2}u + \frac{n-2}{n-1}\int \sec^{n-2}u \, du$
78.  $\int \csc^n u \, du = \frac{-1}{n-1}\cot u \csc^{n-2}u + \frac{n-2}{n-1}\int \csc^{n-2}u \, du$
79.  $\int \sin au \sin bu \, du = \frac{\sin(a-b)u}{2(a-b)} - \frac{\sin(a+b)u}{2(a+b)} + C$
80.  $\int \cos au \cos bu \, du = \frac{\sin(a-b)u}{2(a-b)} + \frac{\sin(a+b)u}{2(a+b)} + C$
81.  $\int \sin au \cos bu \, du = -\frac{\cos(a-b)u}{2(a-b)} - \frac{\cos(a+b)u}{2(a+b)} + C$
82.  $\int u \sin u \, du = \sin u - u \cos u + C$
83.  $\int u \cos u \, du = \cos u + u \sin u + C$
84.  $\int u^n \sin u \, du = -u^n \cos u + n \int u^{n-1} \cos u \, du$
85.  $\int u^n \cos u \, du = u^n \sin u - n \int u^{n-1} \sin u \, du$
86.  $\int \sin^n u \cos^m u \, du = -\frac{\sin^{n-1}u \cos^{m+1}u}{n+m} + \frac{n-1}{n+m}\int \sin^{n-2}u \cos^m u \, du$   
 $= \frac{\sin^{n+1}u \cos^{m-1}u}{n+m} + \frac{m-1}{n+m}\int \sin^n u \cos^{m-2}u \, du$

FORMAS TRIGONOMÉTRICAS INVERSAS

87.  $\int \sin^{-1}u \, du = u \sin^{-1}u + \sqrt{1-u^2} + C$
88.  $\int \cos^{-1}u \, du = u \cos^{-1}u - \sqrt{1-u^2} + C$
89.  $\int \tan^{-1}u \, du = u \tan^{-1}u - \frac{1}{2}\ln(1+u^2) + C$
90.  $\int u \sin^{-1}u \, du = \frac{2u^2-1}{4}\sin^{-1}u + \frac{u\sqrt{1-u^2}}{4} + C$
91.  $\int u \cos^{-1}u \, du = \frac{2u^2-1}{4}\cos^{-1}u - \frac{u\sqrt{1-u^2}}{4} + C$
92.  $\int u \tan^{-1}u \, du = \frac{u^2+1}{2}\tan^{-1}u - \frac{u}{2} + C$
93.  $\int u^n \sin^{-1}u \, du = \frac{1}{n+1}\left[u^{n+1}\sin^{-1}u - \int \frac{u^{n+1}du}{\sqrt{1-u^2}}\right], \quad n \neq -1$
94.  $\int u^n \cos^{-1}u \, du = \frac{1}{n+1}\left[u^{n+1}\cos^{-1}u + \int \frac{u^{n+1}du}{\sqrt{1-u^2}}\right], \quad n \neq -1$
95.  $\int u^n \tan^{-1}u \, du = \frac{1}{n+1}\left[u^{n+1}\tan^{-1}u - \int \frac{u^{n+1}du}{1+u^2}\right], \quad n \neq -1$

TABLA DE INTEGRALES

FORMAS EXPONENCIALES Y LOGARÍTMICAS

$$96. \int u e^{au} du = \frac{1}{a^2} (au - 1) e^{au} + C$$

$$97. \int u^n e^{au} du = \frac{1}{a} u^n e^{au} - \frac{n}{a} \int u^{n-1} e^{au} du$$

$$98. \int e^{au} \sin bu du = \frac{e^{au}}{a^2 + b^2} (a \sin bu - b \cos bu) + C$$

$$99. \int e^{au} \cos bu du = \frac{e^{au}}{a^2 + b^2} (a \cos bu + b \sin bu) + C$$

$$100. \int \ln u du = u \ln u - u + C$$

$$101. \int u^n \ln u du = \frac{u^{n+1}}{(n+1)^2} [(n+1) \ln u - 1] + C$$

$$102. \int \frac{1}{u \ln u} du = \ln |\ln u| + C$$

FORMAS HIPERBÓLICAS

$$103. \int \sinh u du = \cosh u + C$$

$$104. \int \cosh u du = \sinh u + C$$

$$105. \int \tanh u du = \ln \cosh u + C$$

$$106. \int \coth u du = \ln |\sinh u| + C$$

$$107. \int \operatorname{sech} u du = \tan^{-1} |\sinh u| + C$$

$$108. \int \operatorname{csch} u du = \ln \left| \tanh \frac{1}{2} u \right| + C$$

$$109. \int \operatorname{sech}^2 u du = \tanh u + C$$

$$110. \int \operatorname{csch}^2 u du = -\coth u + C$$

$$111. \int \operatorname{sech} u \tanh u du = -\operatorname{sech} u + C$$

$$112. \int \operatorname{csch} u \coth u du = -\operatorname{csch} u + C$$

FORMAS QUE INVOLUCRAN  $\sqrt{2au - u^2}$ ,  $a > 0$

$$113. \int \sqrt{2au - u^2} du = \frac{u - a}{2} \sqrt{2au - u^2} + \frac{a^2}{2} \cos^{-1} \left( \frac{a - u}{a} \right) + C$$

$$114. \int u \sqrt{2au - u^2} du = \frac{2u^2 - au - 3a^2}{6} \sqrt{2au - u^2} + \frac{a^3}{2} \cos^{-1} \left( \frac{a - u}{a} \right) + C$$

$$115. \int \frac{\sqrt{2au - u^2}}{u} du = \sqrt{2au - u^2} + a \cos^{-1} \left( \frac{a - u}{a} \right) + C$$

$$116. \int \frac{\sqrt{2au - u^2}}{u^2} du = -\frac{2\sqrt{2au - u^2}}{u} - \cos^{-1} \left( \frac{a - u}{a} \right) + C$$

$$117. \int \frac{du}{\sqrt{2au - u^2}} = \cos^{-1} \left( \frac{a - u}{a} \right) + C$$

$$118. \int \frac{u du}{\sqrt{2au - u^2}} = -\sqrt{2au - u^2} + a \cos^{-1} \left( \frac{a - u}{a} \right) + C$$

$$119. \int \frac{u^2 du}{\sqrt{2au - u^2}} = -\frac{(u + 3a)}{2} \sqrt{2au - u^2} + \frac{3a^2}{2} \cos^{-1} \left( \frac{a - u}{a} \right) + C$$

$$120. \int \frac{du}{u \sqrt{2au - u^2}} = -\frac{\sqrt{2au - u^2}}{au} + C$$