

Corte aquí y guarde para consulta

## ÁLGEBRA

### Operaciones aritméticas

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

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

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

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

### Exponentes y radicales

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

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

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

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

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

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

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

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

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

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

### Factorización de polinomios especiales

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

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

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

### Teorema del binomio

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

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

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

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

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

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

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

### 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

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

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

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

## GEOMETRÍA

### Fórmulas geométricas

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

Triángulo

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

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

Círculo

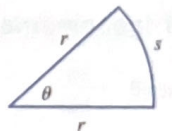
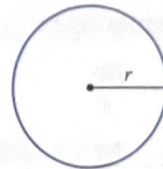
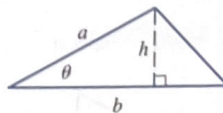
$$A = \pi r^2$$

$$C = 2\pi r$$

Sector de círculo

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

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



Esfera

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

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

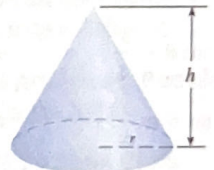
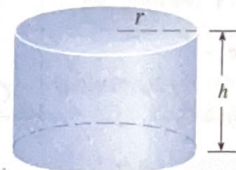
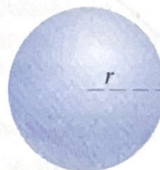
Cilindro

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

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

### Rectas

Pendiente de la recta que pasa por  $P_1(x_1, y_1)$  y  $P_2(x_2, y_2)$ :

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

Ecuación punto-pendiente de la recta que pasa por  $P_1(x_1, y_1)$  con pendiente  $m$ :

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

Ecuación pendiente-intersección de la recta con pendiente  $m$  e intersección en  $y = b$ :

$$y = mx + b$$

### Círculos

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

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

## TRIGONOMETRÍA

### Medición de ángulos

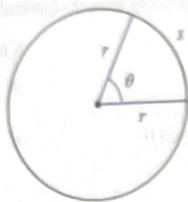
$$\pi \text{ radianes} = 180^\circ$$

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

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

$$s = r\theta$$

( $\theta$  en radianes)



### Trigonometría de ángulo recto

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

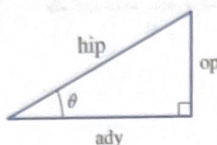
$$\text{csc } \theta = \frac{\text{hip}}{\text{op}}$$

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

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

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

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



### Funciones trigonométricas

$$\text{sen } \theta = \frac{y}{r}$$

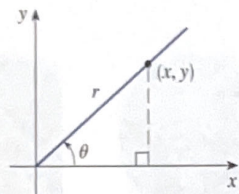
$$\text{csc } \theta = \frac{r}{y}$$

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

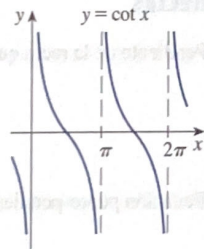
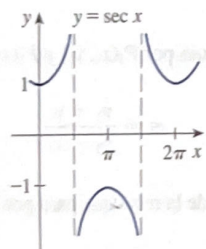
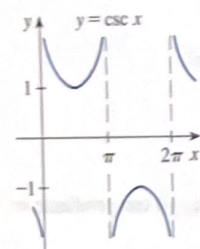
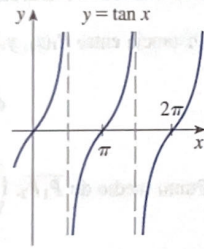
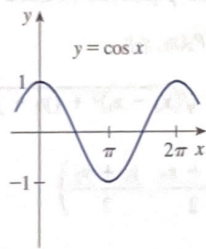
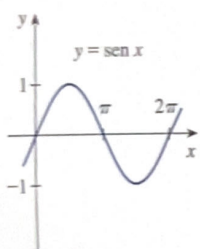
$$\text{sec } \theta = \frac{r}{x}$$

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

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



### Gráficas de funciones trigonométricas



### Funciones trigonométricas de ángulos importantes

$\theta$	radianes	$\text{sen } \theta$	$\text{cos } \theta$	$\text{tan } \theta$
$0^\circ$	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

$$\text{csc } \theta = \frac{1}{\text{sen } \theta}$$

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

$$\text{tan } \theta = \frac{\text{sen } \theta}{\text{cos } \theta}$$

$$\text{cot } \theta = \frac{\text{cos } \theta}{\text{sen } \theta}$$

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

$$\text{sen}^2 \theta + \text{cos}^2 \theta = 1$$

$$1 + \text{tan}^2 \theta = \text{sec}^2 \theta$$

$$1 + \text{cot}^2 \theta = \text{csc}^2 \theta$$

$$\text{sen}(-\theta) = -\text{sen } \theta$$

$$\text{cos}(-\theta) = \text{cos } \theta$$

$$\text{tan}(-\theta) = -\text{tan } \theta$$

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

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

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

### Ley de los senos

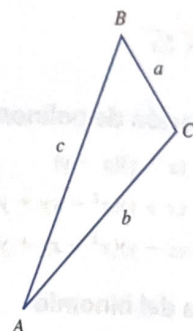
$$\frac{\text{sen } A}{a} = \frac{\text{sen } B}{b} = \frac{\text{sen } C}{c}$$

### Ley de los cosenos

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

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

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



### Fórmulas de adición y sustracción

$$\text{sen}(x + y) = \text{sen } x \text{ cos } y + \text{cos } x \text{ sen } y$$

$$\text{sen}(x - y) = \text{sen } x \text{ cos } y - \text{cos } x \text{ sen } y$$

$$\text{cos}(x + y) = \text{cos } x \text{ cos } y - \text{sen } x \text{ sen } y$$

$$\text{cos}(x - y) = \text{cos } x \text{ cos } y + \text{sen } x \text{ sen } y$$

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

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

### Fórmulas del ángulo doble

$$\text{sen } 2x = 2 \text{ sen } x \text{ cos } x$$

$$\text{cos } 2x = \text{cos}^2 x - \text{sen}^2 x = 2 \text{cos}^2 x - 1 = 1 - 2 \text{sen}^2 x$$

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

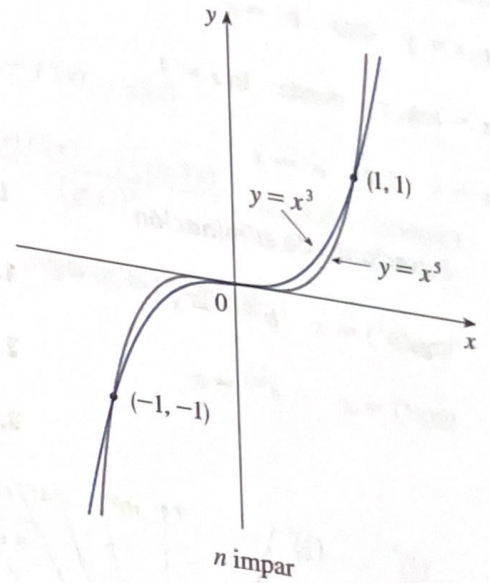
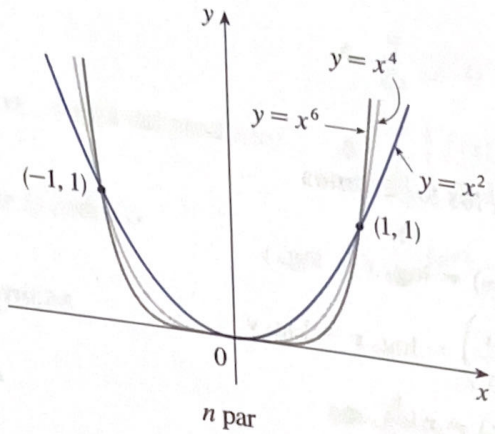
### Fórmulas del ángulo medio

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

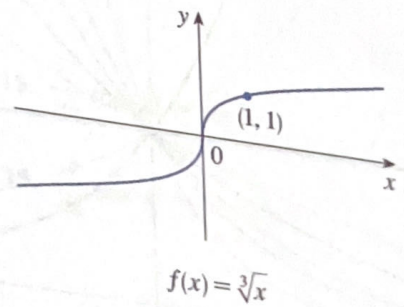
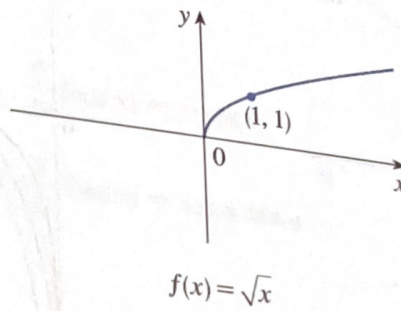


Funciones de potencia o potenciales  $f(x) = x^n$

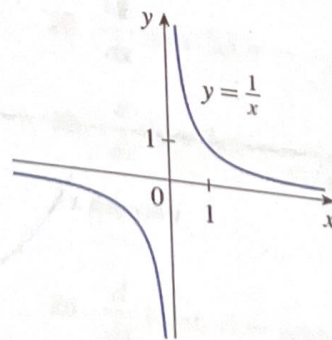
(i)  $f(x) = x^n$ ,  $n$  un entero positivo



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



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

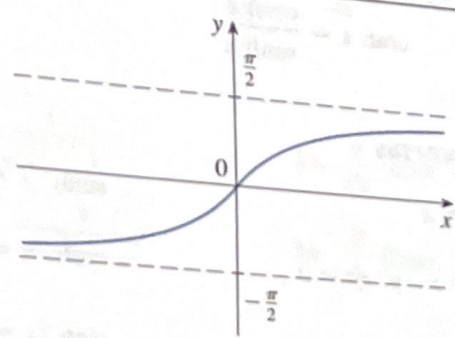


Funciones trigonométricas inversas

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

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

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



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

$y = \text{tan}^{-1}x = \text{arctan } x$

**FUNCIONES ESPECIALES**

**Funciones exponenciales y logarítmicas**

$$\log_b x = y \iff b^y = x$$

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

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

*Ecuaciones de eliminación*

$$\log_b(b^x) = x \quad b^{\log_b x} = x$$

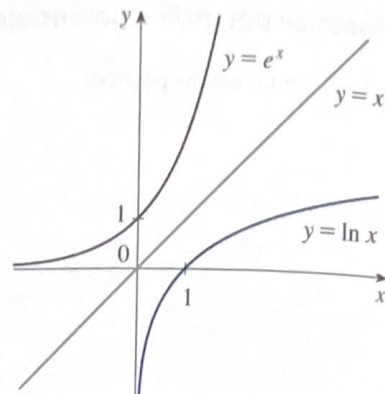
$$\ln(e^x) = x \quad e^{\ln x} = x$$

*Leyes de los logaritmos*

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

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

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

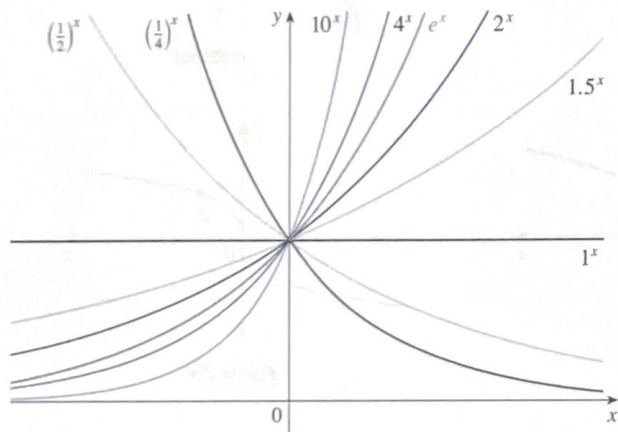


$$\lim_{x \rightarrow -\infty} e^x = 0$$

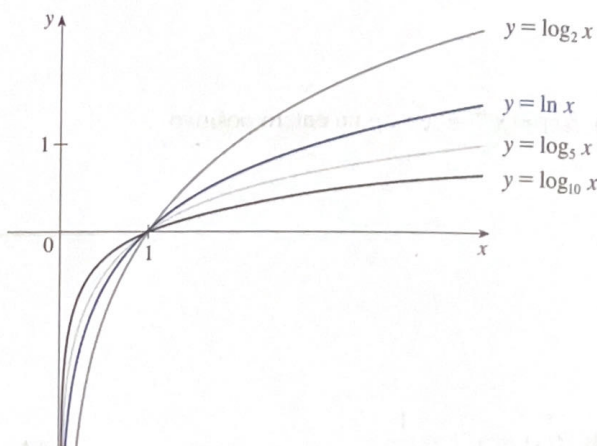
$$\lim_{x \rightarrow \infty} e^x = \infty$$

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

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



Funciones exponenciales



Funciones logarítmicas

**Funciones hiperbólicas**

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

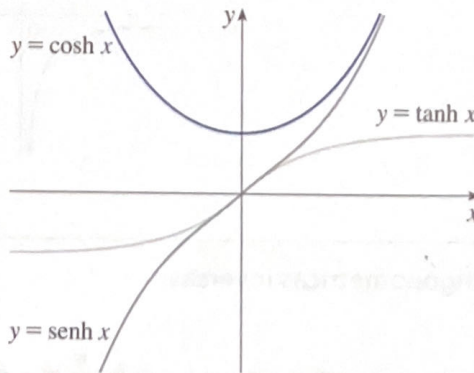
$$\operatorname{csch} x = \frac{1}{\sinh x}$$

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

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

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

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



**Funciones hiperbólicas inversas**

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

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

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

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

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

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