Diplomado En Programación Básica

Universidad Autónoma de Chiapas

Centro Mesoamericano de Física Teórica

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MATHEMATICA

WOLFRAM

1. Introducción

El presente cuaderno constituye un recurso de apoyo para el aprendizaje de Mathematica orientado a la programación y al uso de sus principales funciones en contextos académicos y prácticos. El contenido se organiza de manera progresiva iniciando con operaciones básicas sobre listas, expresiones matemáticas y representaciones gráficas para avanzar hacia temas más complejos como manejo de entidades, conversiones de unidades, generación de visualizaciones interactivas y aplicaciones en análisis de datos.

El enfoque seguido combina teoría con ejemplos prácticos que buscan ilustrar no solo la sintaxis del lenguaje sino también la lógica detrás de cada comando. Se ha procurado mantener una estructura clara donde cada sección incluye subtítulos, descripciones y comentarios en el código para facilitar la comprensión. Esto permite que el material pueda ser utilizado tanto por estudiantes en formación como por interesados en explorar las capacidades del software en distintos escenarios.

Cabe señalar que el documento reúne apuntes propios sistematizados a partir del estudio y la práctica personal. Estos apuntes no reemplazan la documentación oficial de Mathematica pero sí constituyen un complemento útil para guiar el aprendizaje y servir como referencia en la resolución de ejercicios y proyectos futuros.

2. Tabla de contenidos

Tareas

Instrucciones: En esta sección se agrupan las tareas asignadas.

Tarea 3 – Aplicaciones de Funciones Trascendentes

2025/09/29

1. Calcular las siguientes operaciones:

1.1. sin(45°)

```
In[•]:= Sin[45 Degree]
        seno  grado
```

Out[•]=

$$\frac{1}{\sqrt{2}}$$

1.2. cos(90°)

```
In[•]:= N[Cos[90 Degree]]
        ·· coseno  grado
```

Out[•]=

```
0.
```

1.3. tan(π/2)

```
# Indeterminación: tangente no está definida en x = π/2
```

```
In[•]:= Tan[π/2]
        tangente
```

Out[•]=

```
ComplexInfinity
```

1.4. exp(0)

```
In[•]:= Exp[0]
        exponencial
```

Out[•]=

```
1
```

1.5. arccos(0)

```
In[•]:= N[ArcCos[0] / Degree]
        ·· arco coseno  grado
```

Out[•]=

```
90.
```

1.6. sin(π/2)

In[•]:=
```
Sin[π / 2]
```
seno

Out[•]=
```
1
```

1.7. tan(0)

In[•]:=
```
Tan[0]
```
tangente

Out[•]=
```
0
```

1.8. $e^{i\theta}$

In[•]:=
```
N[Exp[iΘ]]
```
·· exponencial

Out[•]=
```
2.71828^(iΘ)
```

1.9. $\frac{1}{e^x}$

In[•]:=
```
N[1 / Exp[x]]
```
valo·· exponencia

Out[•]=
```
2.71828^(-1. x)
```

1.10. log[10]

In[•]:=
```
N[Log[10]]
```
·· logaritmo

Out[•]=
```
2.30259
```

1.11. log[50]

In[•]:=
```
N[Log[50]]
```
·· logaritmo

Out[•]=
```
3.91202
```

1.12. log(0)

In[•]:=
```
Log[0]
```
logaritmo

Out[•]=
```
-∞
```

1.13. sec(4°)

In[•]:=
```
N[1/Cos[4]]
```
valor numérico

Out[•]=
```
-1.52989
```

1.14. 1/0

```
# Infinito no está definido en los reales: división por cero no es válida
```

In[•]:=
```
1 / 0
```

Power: Infinite expression $\frac{1}{0}$ encountered.

Out[•]=
```
ComplexInfinity
```

1.15. sin(90°)

In[•]:=
```
Sin[90 Degree]
```
seno grado

Out[•]=
```
1
```

1.16. $\sqrt{8769}$

In[•]:=
```
N[Sqrt[8769]]
```
raíz cuadrada

Out[•]=
```
93.6429
```

2. Expandir las siguientes expresiones usando el comando *TrigExpand*:

2.1. sin(2x)

In[•]:=
```
TrigExpand[Sin[2 x]]
```
expande fun··· seno

Out[•]=
```
2 Cos[x] Sin[x]
```

2.2. sin(3x)

In[•]:=
```
TrigExpand[Sin[3 x]]
```
expande fun··· seno

Out[•]=
```
3 Cos[x]^2 Sin[x] - Sin[x]^3
```

2.3. cos(2x)

In[•]:=
```
TrigExpand[Cos[2 x]]
```
expande fun··· coseno

Out[•]=
```
Cos[x]^2 - Sin[x]^2
```

2.4. tanh(2x)

```
In[•]:= TrigExpand[Tanh[2 x]]
        expande fun··· tangente hiper
```

```
Out[•]= 2 Cosh[x] Sinh[x] / (Cosh[x]^2 + Sinh[x]^2)
```

2.5. sin(x + y)

```
In[•]:= TrigExpand[Sin[x + y]]
        expande fun··· seno
```

```
Out[•]= Cos[y] Sin[x] + Cos[x] Sin[y]
```

2.6. cos(x + y)

```
In[•]:= TrigExpand[Cos[x + y]]
        expande fun··· coseno
```

```
Out[•]= Cos[x] Cos[y] - Sin[x] Sin[y]
```

3. Graficar todas las funciones Trigonométricas de 0 a 10π.

- *Funciones trigonométricas circulares estándar*

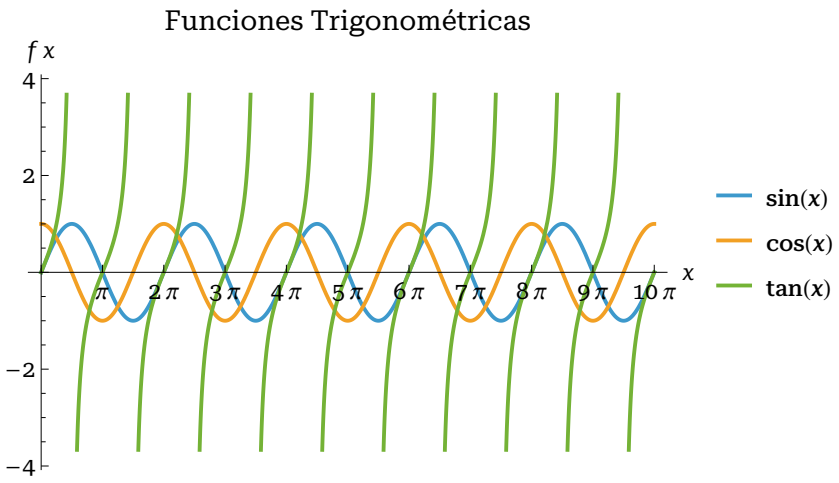
```
# Rango para mejor visibilidad [0 a 10π]
```

```
In[•]:= circulares = {Sin[x], Cos[x], Tan[x]}
                     seno     coseno   tangente
```

```
Out[•]= {Sin[x], Cos[x], Tan[x]}
```

In[•]:=
```
Plot[circulares, {x, 0, 10 Pi}, Ticks → {Table[{n Pi, n Pi}, {n, 0, 10}], Automatic},
 PlotLabel → "Funciones Trigonométricas", PlotLegends → "Expressions",
 AxesLabel → {HoldForm[x], HoldForm[f (x)]},
 LabelStyle → {FontFamily → "Roboto Serif 20pt", 12, GrayLevel[0]}]
```
representación gráfica · nú··· · marcas · tabla · nú··· · número pi · automático
etiqueta de representación · leyendas de representación
etiqueta de ejes · forma sin evalu··· · forma sin evaluación
estilo de etiqueta · familia de tipo de letra · nivel de gris

Out[•]=

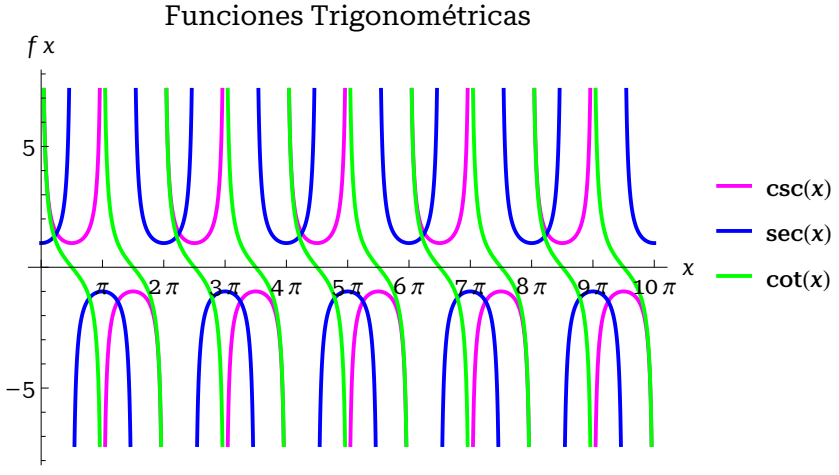


In[•]:=
```
circulares2 = {Csc[x], Sec[x], Cot[x]}
```
cosecante · secante · cotangente

Out[•]=
```
{Csc[x], Sec[x], Cot[x]}
```

In[•]:=
```
Plot[circulares2, {x, 0, 10 Pi}, Ticks → {Table[{n Pi, n Pi}, {n, 0, 10}], Automatic},
 PlotStyle → {Magenta, Blue, Green}, PlotLabel → "Funciones Trigonométricas",
 PlotLegends → "Expressions", AxesLabel → {HoldForm[x], HoldForm[f (x)]},
 LabelStyle → {FontFamily → "Roboto Serif 20pt", 12, GrayLevel[0]}]
```
representación gráfica · nú··· · marcas · tabla · nú··· · número pi · automático
estilo de repre··· · magenta · azul · verde · etiqueta de representación
leyendas de representación · etiqueta de ejes · forma sin evalu··· · forma sin evaluación
estilo de etiqueta · familia de tipo de letra · nivel de gris

Out[•]=



■ *Funciones trigonométricas inversas*

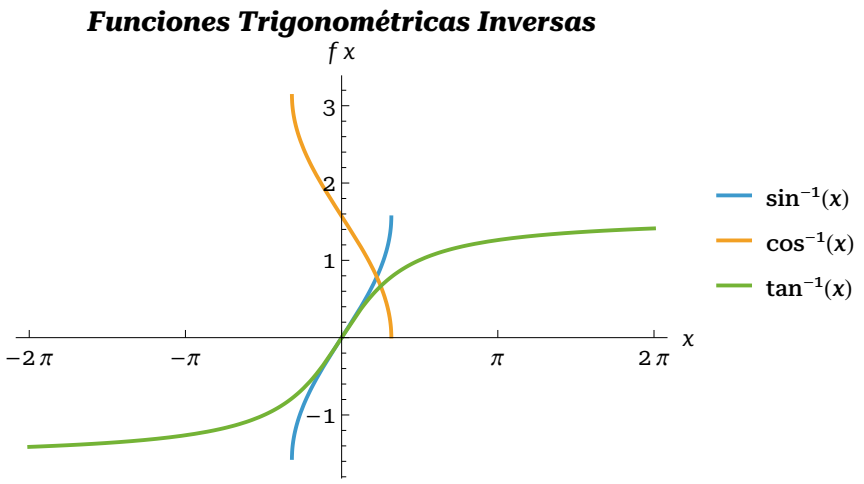
```
# Rango para mejor visibilidad [-2π a 2π]
```

In[•]:=
```
inversas = {ArcSin[x], ArcCos[x], ArcTan[x]}
```
arco seno · arco coseno · arco tangente

Out[•]=
```
{ArcSin[x], ArcCos[x], ArcTan[x]}
```

In[•]:=
```
Plot[inversas, {x, -2 π, 2 π}, Ticks → {Table[{n Pi, n Pi}, {n, -2, 2}], Automatic},
 PlotLabel → "Funciones Trigonométricas Inversas",
 PlotLegends → "Expressions", AxesLabel → {HoldForm[x], HoldForm[f (x)]},
 LabelStyle → {FontFamily → "Roboto Serif 20pt", 12, GrayLevel[0]}]
```
representación gráfica · marcas · tabla · número pi · automático · etiqueta de representación · leyendas de representación · etiqueta de ejes · forma sin evaluación · estilo de etiqueta · familia de tipo de letra · nivel de gris

Out[•]=

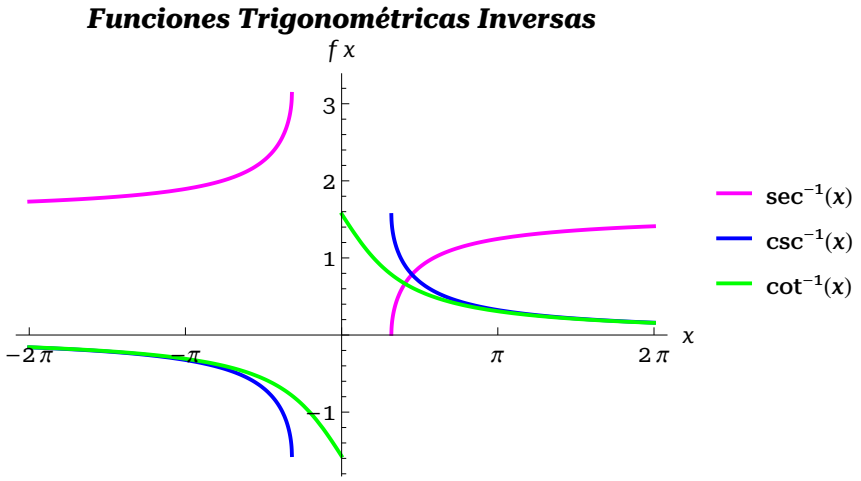


In[•]:=
```
inversas2 = {ArcSec[x], ArcCsc[x], ArcCot[x]}
```
arco secante · arco cosecante · arco cotangente

Out[•]=
```
{ArcSec[x], ArcCsc[x], ArcCot[x]}
```

In[•]:=
```
Plot[inversas2, {x, -2 π, 2 π}, Ticks → {Table[{n Pi, n Pi}, {n, -2, 2}], Automatic},
 PlotStyle → {Magenta, Blue, Green},
 PlotLabel → "Funciones Trigonométricas Inversas",
 PlotLegends → "Expressions", AxesLabel → {HoldForm[x], HoldForm[f (x)]},
 LabelStyle → {FontFamily → "Roboto Serif 20pt", 12, GrayLevel[0]}]
```
representación gráfica | marcas | tabla | nú··· | número pi | automático
estilo de repre··· | magenta | azul | verde
etiqueta de representación
leyendas de representación | etiqueta de ejes | forma sin evalu··· | forma sin evaluación
estilo de etiqueta | familia de tipo de letra | nivel de gris

Out[•]=



■ *Funciones trigonométricas hiperbólicas*

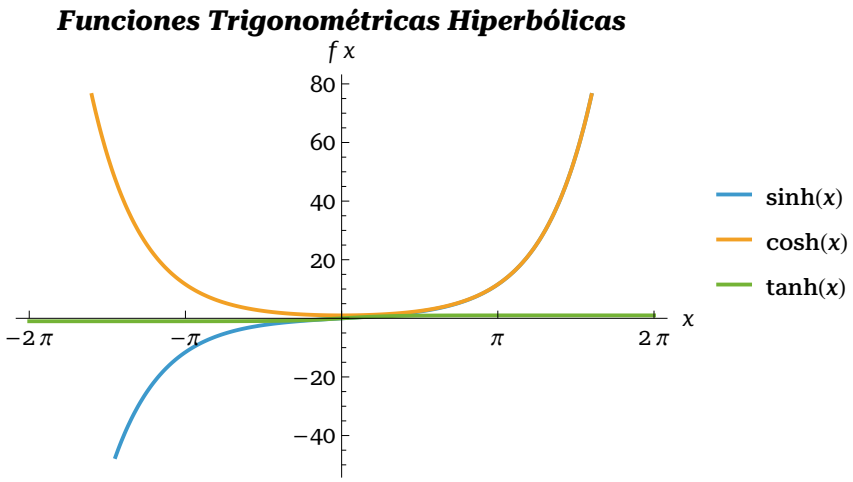
```
# Rango para mejor visibilidad [-2π a 2π]
```

In[•]:=
```
hiperbolicas = {Sinh[x], Cosh[x], Tanh[x]}
```
seno hipe··· | coseno hi··· | tangente hip

Out[•]=
```
{Sinh[x], Cosh[x], Tanh[x]}
```

In[•]:=
```
Plot[hiperbolicas, {x, -2 π, 2 π}, Ticks → {Table[{n Pi, n Pi}, {n, -2, 2}], Automatic},
 PlotLabel → "Funciones Trigonométricas Hiperbólicas",
 PlotLegends → "Expressions", AxesLabel → {HoldForm[x], HoldForm[f (x)]},
 LabelStyle → {FontFamily → "Roboto Serif 20pt", 12, GrayLevel[0]}]
```

Out[•]=

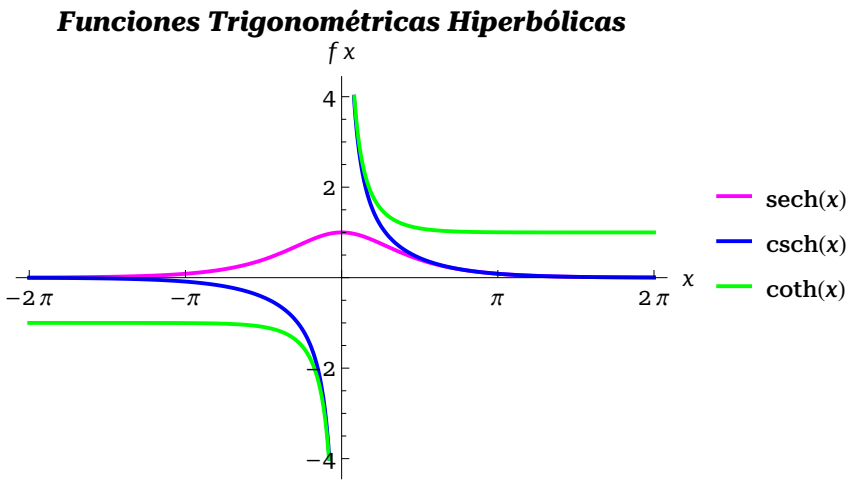


In[•]:=
```
hiperbolicas2 = {Sech[x], Csch[x], Coth[x]}
```

Out[•]=
```
{Sech[x], Csch[x], Coth[x]}
```

In[•]:=
```
Plot[hiperbolicas2, {x, -2 π, 2 π},
 representación gráfica
  Ticks → {Table[{n Pi, n Pi}, {n, -2, 2}], Automatic},
  marcas  tabla  nú···  número pi  automático
  PlotStyle → {Magenta, Blue, Green},
  estilo de repre···  magenta  azul  verde
  PlotLabel → "Funciones Trigonométricas Hiperbólicas",
  etiqueta de representación
  PlotLegends → "Expressions", AxesLabel → {HoldForm[x], HoldForm[f (x)]},
  leyendas de representación  etiqueta de ejes  forma sin evalu···  forma sin evaluación
  LabelStyle → {FontFamily → "Roboto Serif 20pt", 12, GrayLevel[0]}]
  estilo de etiqueta  familia de tipo de letra  nivel de gris
```

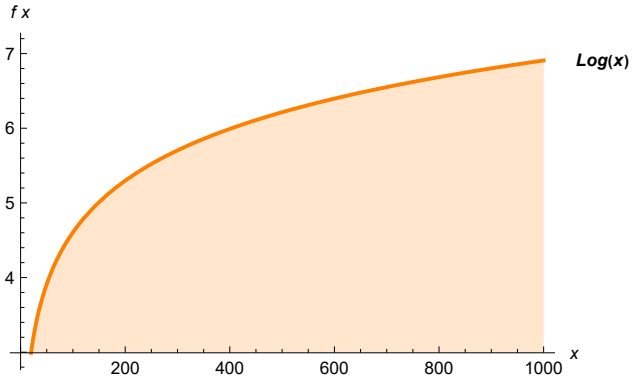
Out[•]=



4. Graficar el log(x) de 0 a 1000.

In[•]:=
```
Plot[Labeled[Log[x], "Log(x)", After],
 repr···  etiquetado  logaritmo  logaritmo  después
  {x, 1, 1000}, Filling → Bottom, FillingStyle → LightOrange,
                relleno  abajo  estilo de relleno  naranja claro
  PlotStyle → Orange, AxesLabel → {HoldForm[x], HoldForm[f (x)]}]
  estilo de repr···  naranja  etiqueta de ejes  forma sin evalu···  forma sin evaluación
```

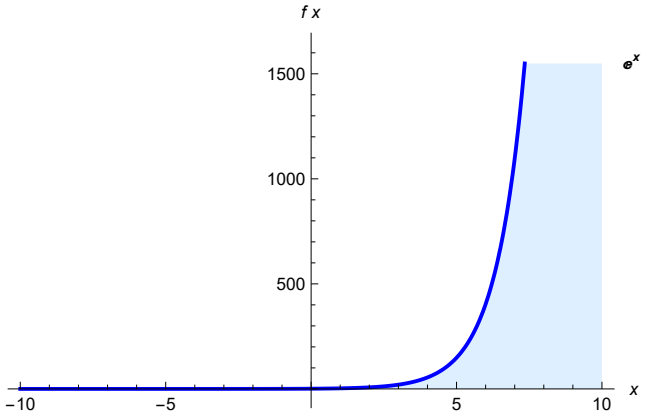
Out[•]=



5. Graficar e^x de -10 a 10.

In[•]:=
```
Plot[Labeled[Exp[x], "e^x", After],
 {x, -10, 10}, Filling → Bottom, FillingStyle → LightBlue,
 PlotStyle → Blue, AxesLabel → {HoldForm[x], HoldForm[f (x)]}]
```

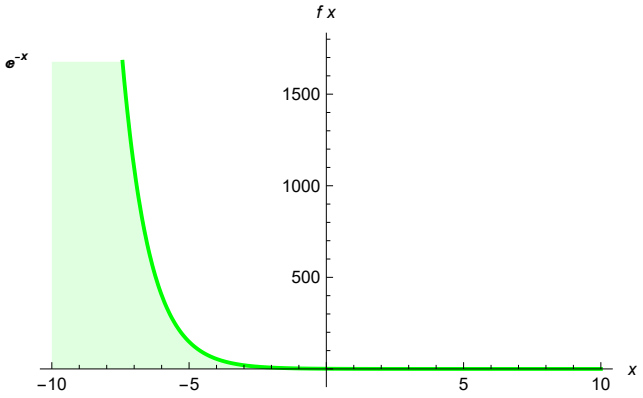
Out[•]=



6. Graficar e^{-x} de -10 a 10.

In[•]:=
```
Plot[Labeled[Exp[-x], "e^-x", Before],
 {x, -10, 10}, Filling → Bottom, FillingStyle → LightGreen,
 PlotStyle → Green, AxesLabel → {HoldForm[x], HoldForm[f (x)]}]
```

Out[•]=



7. Hacer una expansión de potencias de todas las funciones trigonométricas alrededor de cero con 10 términos cada una.

```
# Series de Maclaurin para el desarrollo alrededor de x=0
```

- *Funciones trigonométricas circulares estándar*

In[•]:=
```
Normal[Series[Sin[x], {x, 0, 10}]]
```
normal serie seno

Out[•]=
$$x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{362\,880}$$

In[•]:=
```
Normal[Series[Cos[x], {x, 0, 10}]]
```
normal serie coseno

Out[•]=
$$1 - \frac{x^2}{2} + \frac{x^4}{24} - \frac{x^6}{720} + \frac{x^8}{40\,320} - \frac{x^{10}}{3\,628\,800}$$

In[•]:=
```
Normal[Series[Tan[x], {x, 0, 10}]]
```
normal serie tangente

Out[•]=
$$x + \frac{x^3}{3} + \frac{2\,x^5}{15} + \frac{17\,x^7}{315} + \frac{62\,x^9}{2835}$$

In[•]:=
```
Normal[Series[Sec[x], {x, 0, 10}]]
```
normal serie secante

Out[•]=
$$1 + \frac{x^2}{2} + \frac{5\,x^4}{24} + \frac{61\,x^6}{720} + \frac{277\,x^8}{8064} + \frac{50\,521\,x^{10}}{3\,628\,800}$$

In[•]:=
```
Normal[Series[Csc[x], {x, 0, 10}]]
```
normal serie cosecante

Out[•]=
$$\frac{1}{x} + \frac{x}{6} + \frac{7\,x^3}{360} + \frac{31\,x^5}{15\,120} + \frac{127\,x^7}{604\,800} + \frac{73\,x^9}{3\,421\,440}$$

In[•]:=
```
Normal[Series[Cot[x], {x, 0, 10}]]
```
normal serie cotangente

Out[•]=
$$\frac{1}{x} - \frac{x}{3} - \frac{x^3}{45} - \frac{2\,x^5}{945} - \frac{x^7}{4725} - \frac{2\,x^9}{93\,555}$$

■ *Funciones trigonométricas inversas*

In[•]:=
```
Normal[Series[ArcSin[x], {x, 0, 10}]]
```
normal serie arco seno

Out[•]=
$$x + \frac{x^3}{6} + \frac{3\,x^5}{40} + \frac{5\,x^7}{112} + \frac{35\,x^9}{1152}$$

In[•]:=
```
Normal[Series[ArcCos[x], {x, 0, 10}]]
```
normal serie arco coseno

Out[•]=
$$\frac{\pi}{2} - x - \frac{x^3}{6} - \frac{3\,x^5}{40} - \frac{5\,x^7}{112} - \frac{35\,x^9}{1152}$$

In[•]:=
```
Normal[Series[ArcTan[x], {x, 0, 10}]]
```
normal serie arco tangente

Out[•]=
$$x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \frac{x^9}{9}$$

In[•]:=
```
Normal[Series[ArcSec[x], {x, 0, 10}]]
```
normal serie arco secante

Out[•]=
$$-\frac{1}{4}\sqrt{-\frac{1}{x^2}}\,x^3 - \frac{3}{32}\sqrt{-\frac{1}{x^2}}\,x^5 - \frac{5}{96}\sqrt{-\frac{1}{x^2}}\,x^7 - \frac{35\sqrt{-\frac{1}{x^2}}\,x^9}{1024} - \frac{63\sqrt{-\frac{1}{x^2}}\,x^{11}}{2560} + \frac{1}{2}\left(\pi + \sqrt{-\frac{1}{x^2}}\,x\,\text{Log}\left[-\frac{4}{x^2}\right]\right)$$

In[•]:=
```
Normal[Series[ArcCsc[x], {x, 0, 10}]]
```
normal serie arco cosecante

Out[•]=
$$\frac{1}{4}\sqrt{-\frac{1}{x^2}}\,x^3 + \frac{3}{32}\sqrt{-\frac{1}{x^2}}\,x^5 + \frac{5}{96}\sqrt{-\frac{1}{x^2}}\,x^7 + \frac{35\sqrt{-\frac{1}{x^2}}\,x^9}{1024} + \frac{63\sqrt{-\frac{1}{x^2}}\,x^{11}}{2560} - \frac{1}{2}\sqrt{-\frac{1}{x^2}}\,x\,\text{Log}\left[-\frac{4}{x^2}\right]$$

In[•]:=
```
Normal[Series[ArcCot[x], {x, 0, 10}]]
```
normal serie arco cotangente

Out[•]=
$$-x + \frac{1}{2}\pi\sqrt{\frac{1}{x^2}}\,x + \frac{x^3}{3} - \frac{x^5}{5} + \frac{x^7}{7} - \frac{x^9}{9}$$

■ *Funciones trigonométricas hiperbólicas*

In[•]:=
```
Normal[Series[Sinh[x], {x, 0, 10}]]
```
normal serie seno hiperbólico

Out[•]=
$$x + \frac{x^3}{6} + \frac{x^5}{120} + \frac{x^7}{5040} + \frac{x^9}{362\,880}$$

In[•]:=
```
Normal[Series[Cosh[x], {x, 0, 10}]]
```
normal serie coseno hiperbólico

Out[•]=
$$1 + \frac{x^2}{2} + \frac{x^4}{24} + \frac{x^6}{720} + \frac{x^8}{40\,320} + \frac{x^{10}}{3\,628\,800}$$

In[•]:=
```
Normal[Series[Tanh[x], {x, 0, 10}]]
```
normal serie tangente hiperbólica

Out[•]=
$$x - \frac{x^3}{3} + \frac{2\,x^5}{15} - \frac{17\,x^7}{315} + \frac{62\,x^9}{2835}$$

In[•]:=
```
Normal[Series[Sech[x], {x, 0, 10}]]
```
normal serie secante hiperbólica

Out[•]=
$$1 - \frac{x^2}{2} + \frac{5\,x^4}{24} - \frac{61\,x^6}{720} + \frac{277\,x^8}{8064} - \frac{50\,521\,x^{10}}{3\,628\,800}$$

In[•]:=
```
Normal[Series[Csch[x], {x, 0, 10}]]
```
normal serie cosecante hiperbólica

Out[•]=
$$\frac{1}{x} - \frac{x}{6} + \frac{7\,x^3}{360} - \frac{31\,x^5}{15\,120} + \frac{127\,x^7}{604\,800} - \frac{73\,x^9}{3\,421\,440}$$

In[•]:=
```
Normal[Series[Coth[x], {x, 0, 10}]]
```
normal serie cotangente hiperbólica

Out[•]=
$$\frac{1}{x} + \frac{x}{3} - \frac{x^3}{45} + \frac{2\,x^5}{945} - \frac{x^7}{4725} + \frac{2\,x^9}{93\,555}$$

8. Repetir el ejercicio anterior alrededor de x_0 = a.

```
# Series de Taylor para el desarrollo alrededor de un punto arbitrario x=a
```

■ *Funciones trigonométricas circulares estándar*

In[•]:=
```
Normal[Series[Sin[x], {x, a, 10}]]
```
normal serie seno

Out[•]=
$$(-a+x)\,\text{Cos}[a] - \frac{1}{6}\,(-a+x)^3\,\text{Cos}[a] + \frac{1}{120}\,(-a+x)^5\,\text{Cos}[a] - \frac{(-a+x)^7\,\text{Cos}[a]}{5040} + \frac{(-a+x)^9\,\text{Cos}[a]}{362\,880} + \text{Sin}[a] - \frac{1}{2}\,(-a+x)^2\,\text{Sin}[a] + \frac{1}{24}\,(-a+x)^4\,\text{Sin}[a] - \frac{1}{720}\,(-a+x)^6\,\text{Sin}[a] + \frac{(-a+x)^8\,\text{Sin}[a]}{40\,320} - \frac{(-a+x)^{10}\,\text{Sin}[a]}{3\,628\,800}$$

In[•]:=
```
Normal[Series[Cos[x], {x, a, 10}]]
```
normal serie coseno

Out[•]=

$$\cos[a] - \frac{1}{2}(-a+x)^2\cos[a] + \frac{1}{24}(-a+x)^4\cos[a] - \frac{1}{720}(-a+x)^6\cos[a] + \frac{(-a+x)^8\cos[a]}{40\,320} - \frac{(-a+x)^{10}\cos[a]}{3\,628\,800} - (-a+x)\sin[a] + \frac{1}{6}(-a+x)^3\sin[a] - \frac{1}{120}(-a+x)^5\sin[a] + \frac{(-a+x)^7\sin[a]}{5040} - \frac{(-a+x)^9\sin[a]}{362\,880}$$

In[•]:=
```
Normal[Series[Tan[x], {x, a, 10}]]
```
normal serie tangente

Out[•]=

$$(-a+x)\sec[a]^2 + \tan[a] + (-a+x)^2\sec[a]^2\tan[a] + (-a+x)^3\left(\frac{1}{3} + \frac{\tan[a]^2}{2} + \tan[a]\left(\frac{5\tan[a]}{6} + \tan[a]^3\right)\right) + (-a+x)^4\left(\frac{17\tan[a]}{24} + \tan[a]^3 - \frac{1}{2}\tan[a]\left(\frac{1}{2} + \tan[a]^2\right) + \tan[a]\left(\frac{5}{24} + \frac{7\tan[a]^2}{6} + \tan[a]^4\right)\right) + (-a+x)^5\left(\frac{13}{60} + \frac{29\tan[a]^2}{24} + \tan[a]^4 + \frac{1}{6}\left(-\frac{1}{2} - \tan[a]^2\right) - \frac{1}{2}\tan[a]\left(\frac{5\tan[a]}{6} + \tan[a]^3\right) + \tan[a]\left(\frac{61\tan[a]}{120} + \frac{3\tan[a]^3}{2} + \tan[a]^5\right)\right) + (-a+x)^6\left(\frac{371\tan[a]}{720} + \frac{3\tan[a]^3}{2} + \tan[a]^5 + \frac{1}{24}\tan[a]\left(\frac{1}{2} + \tan[a]^2\right) + \frac{1}{6}\left(-\frac{5\tan[a]}{6} - \tan[a]^3\right) - \frac{1}{2}\tan[a]\left(\frac{5}{24} + \frac{7\tan[a]^2}{6} + \tan[a]^4\right) + \tan[a]\left(\frac{61}{720} + \frac{331\tan[a]^2}{360} + \frac{11\tan[a]^4}{6} + \tan[a]^6\right)\right) + (-a+x)^7\left(\frac{71}{840} + \frac{661\tan[a]^2}{720} + \frac{11\tan[a]^4}{6} + \tan[a]^6 + \frac{1}{120}\left(\frac{1}{2} + \tan[a]^2\right) + \frac{1}{24}\tan[a]\left(\frac{5\tan[a]}{6} + \tan[a]^3\right) + \frac{1}{6}\left(-\frac{5}{24} - \frac{7\tan[a]^2}{6} - \tan[a]^4\right) - \frac{1}{2}\tan[a]\left(\frac{61\tan[a]}{120} + \frac{3\tan[a]^3}{2} + \tan[a]^5\right) + \tan[a]\left(\frac{277\tan[a]}{1008} + \frac{173\tan[a]^3}{120} + \frac{13\tan[a]^5}{6} + \tan[a]^7\right)\right) + (-a+x)^8\left(\frac{3691\tan[a]}{13\,440} + \frac{173\tan[a]^3}{120} + \frac{13\tan[a]^5}{6} + \tan[a]^7 - \frac{1}{720}\tan[a]\left(\frac{1}{2} + \tan[a]^2\right) + \frac{1}{120}\left(\frac{5\tan[a]}{6} + \tan[a]^3\right) + \frac{1}{24}\tan[a]\left(\frac{5}{24} + \frac{7\tan[a]^2}{6} + \tan[a]^4\right) + \frac{1}{6}\left(-\frac{61\tan[a]}{120} - \frac{3\tan[a]^3}{2} - \tan[a]^5\right) -$$

$$\frac{1}{2}\,\text{Tan}[a]\left(\frac{61}{720}+\frac{331\,\text{Tan}[a]^2}{360}+\frac{11\,\text{Tan}[a]^4}{6}+\text{Tan}[a]^6\right)+$$

$$\text{Tan}[a]\left(\frac{277}{8064}+\frac{3071\,\text{Tan}[a]^2}{5040}+\frac{83\,\text{Tan}[a]^4}{40}+\frac{5\,\text{Tan}[a]^6}{2}+\text{Tan}[a]^8\right)\Bigg)+$$

$$(-a+x)^9\left(\frac{6233}{181\,440}+\frac{24\,569\,\text{Tan}[a]^2}{40\,320}+\frac{83\,\text{Tan}[a]^4}{40}+\frac{5\,\text{Tan}[a]^6}{2}+\text{Tan}[a]^8+\frac{-\frac{1}{2}-\text{Tan}[a]^2}{5040}-\right.$$

$$\frac{1}{720}\,\text{Tan}[a]\left(\frac{5\,\text{Tan}[a]}{6}+\text{Tan}[a]^3\right)+\frac{1}{120}\left(\frac{5}{24}+\frac{7\,\text{Tan}[a]^2}{6}+\text{Tan}[a]^4\right)+\frac{1}{24}\,\text{Tan}[a]$$

$$\left(\frac{61\,\text{Tan}[a]}{120}+\frac{3\,\text{Tan}[a]^3}{2}+\text{Tan}[a]^5\right)+\frac{1}{6}\left(-\frac{61}{720}-\frac{331\,\text{Tan}[a]^2}{360}-\frac{11\,\text{Tan}[a]^4}{6}-\text{Tan}[a]^6\right)-$$

$$\frac{1}{2}\,\text{Tan}[a]\left(\frac{277\,\text{Tan}[a]}{1008}+\frac{173\,\text{Tan}[a]^3}{120}+\frac{13\,\text{Tan}[a]^5}{6}+\text{Tan}[a]^7\right)+$$

$$\text{Tan}[a]\left(\frac{50\,521\,\text{Tan}[a]}{362\,880}+\frac{3403\,\text{Tan}[a]^3}{3024}+\frac{203\,\text{Tan}[a]^5}{72}+\frac{17\,\text{Tan}[a]^7}{6}+\text{Tan}[a]^9\right)\Bigg)+$$

$$(-a+x)^{10}\left(\frac{505\,219\,\text{Tan}[a]}{3\,628\,800}+\frac{3403\,\text{Tan}[a]^3}{3024}+\frac{203\,\text{Tan}[a]^5}{72}+\frac{17\,\text{Tan}[a]^7}{6}+\right.$$

$$\text{Tan}[a]^9+\frac{\text{Tan}[a]\left(\frac{1}{2}+\text{Tan}[a]^2\right)}{40\,320}+\frac{-\frac{5\,\text{Tan}[a]}{6}-\text{Tan}[a]^3}{5040}-$$

$$\frac{1}{720}\,\text{Tan}[a]\left(\frac{5}{24}+\frac{7\,\text{Tan}[a]^2}{6}+\text{Tan}[a]^4\right)+\frac{1}{120}\left(\frac{61\,\text{Tan}[a]}{120}+\frac{3\,\text{Tan}[a]^3}{2}+\text{Tan}[a]^5\right)+$$

$$\frac{1}{24}\,\text{Tan}[a]\left(\frac{61}{720}+\frac{331\,\text{Tan}[a]^2}{360}+\frac{11\,\text{Tan}[a]^4}{6}+\text{Tan}[a]^6\right)+$$

$$\frac{1}{6}\left(-\frac{277\,\text{Tan}[a]}{1008}-\frac{173\,\text{Tan}[a]^3}{120}-\frac{13\,\text{Tan}[a]^5}{6}-\text{Tan}[a]^7\right)-$$

$$\frac{1}{2}\,\text{Tan}[a]\left(\frac{277}{8064}+\frac{3071\,\text{Tan}[a]^2}{5040}+\frac{83\,\text{Tan}[a]^4}{40}+\frac{5\,\text{Tan}[a]^6}{2}+\text{Tan}[a]^8\right)+\text{Tan}[a]$$

$$\left.\left.\left(\frac{50\,521}{3\,628\,800}+\frac{94\,723\,\text{Tan}[a]^2}{259\,200}+\frac{28\,121\,\text{Tan}[a]^4}{15\,120}+\frac{147\,\text{Tan}[a]^6}{40}+\frac{19\,\text{Tan}[a]^8}{6}+\text{Tan}[a]^{10}\right)\right)\right)$$

In[•]:=
```
Normal[Series[Sec[x], {x, a, 10}]]
```
normal serie secante

Out[•]=

$$\text{Sec}[a] + (-a+x)\,\text{Sec}[a]\,\text{Tan}[a] + (-a+x)^2\,\text{Sec}[a]\left(\frac{1}{2} + \text{Tan}[a]^2\right) +$$
$$(-a+x)^3\,\text{Sec}[a]\left(\frac{5\,\text{Tan}[a]}{6} + \text{Tan}[a]^3\right) + (-a+x)^4\,\text{Sec}[a]\left(\frac{5}{24} + \frac{7\,\text{Tan}[a]^2}{6} + \text{Tan}[a]^4\right) +$$
$$(-a+x)^5\,\text{Sec}[a]\left(\frac{61\,\text{Tan}[a]}{120} + \frac{3\,\text{Tan}[a]^3}{2} + \text{Tan}[a]^5\right) +$$
$$(-a+x)^6\,\text{Sec}[a]\left(\frac{61}{720} + \frac{331\,\text{Tan}[a]^2}{360} + \frac{11\,\text{Tan}[a]^4}{6} + \text{Tan}[a]^6\right) +$$
$$(-a+x)^7\,\text{Sec}[a]\left(\frac{277\,\text{Tan}[a]}{1008} + \frac{173\,\text{Tan}[a]^3}{120} + \frac{13\,\text{Tan}[a]^5}{6} + \text{Tan}[a]^7\right) +$$
$$(-a+x)^8\,\text{Sec}[a]\left(\frac{277}{8064} + \frac{3071\,\text{Tan}[a]^2}{5040} + \frac{83\,\text{Tan}[a]^4}{40} + \frac{5\,\text{Tan}[a]^6}{2} + \text{Tan}[a]^8\right) + (-a+x)^9\,\text{Sec}[a]$$
$$\left(\frac{50\,521\,\text{Tan}[a]}{362\,880} + \frac{3403\,\text{Tan}[a]^3}{3024} + \frac{203\,\text{Tan}[a]^5}{72} + \frac{17\,\text{Tan}[a]^7}{6} + \text{Tan}[a]^9\right) + (-a+x)^{10}\,\text{Sec}[a]$$
$$\left(\frac{50\,521}{3\,628\,800} + \frac{94\,723\,\text{Tan}[a]^2}{259\,200} + \frac{28\,121\,\text{Tan}[a]^4}{15\,120} + \frac{147\,\text{Tan}[a]^6}{40} + \frac{19\,\text{Tan}[a]^8}{6} + \text{Tan}[a]^{10}\right)$$

In[•]:=
```
Normal[Series[Csc[x], {x, a, 10}]]
```
normal serie cosecante

Out[•]=

$$\text{Csc}[a] - (-a+x)\,\text{Cot}[a]\,\text{Csc}[a] + (-a+x)^2\left(\frac{1}{2} + \text{Cot}[a]^2\right)\text{Csc}[a] +$$
$$(-a+x)^3\left(-\frac{5\,\text{Cot}[a]}{6} - \text{Cot}[a]^3\right)\text{Csc}[a] + (-a+x)^4\left(\frac{5}{24} + \frac{7\,\text{Cot}[a]^2}{6} + \text{Cot}[a]^4\right)\text{Csc}[a] +$$
$$(-a+x)^5\left(-\frac{61\,\text{Cot}[a]}{120} - \frac{3\,\text{Cot}[a]^3}{2} - \text{Cot}[a]^5\right)\text{Csc}[a] +$$
$$(-a+x)^6\left(\frac{61}{720} + \frac{331\,\text{Cot}[a]^2}{360} + \frac{11\,\text{Cot}[a]^4}{6} + \text{Cot}[a]^6\right)\text{Csc}[a] +$$
$$(-a+x)^7\left(-\frac{277\,\text{Cot}[a]}{1008} - \frac{173\,\text{Cot}[a]^3}{120} - \frac{13\,\text{Cot}[a]^5}{6} - \text{Cot}[a]^7\right)\text{Csc}[a] +$$
$$(-a+x)^8\left(\frac{277}{8064} + \frac{3071\,\text{Cot}[a]^2}{5040} + \frac{83\,\text{Cot}[a]^4}{40} + \frac{5\,\text{Cot}[a]^6}{2} + \text{Cot}[a]^8\right)\text{Csc}[a] + (-a+x)^9$$
$$\left(-\frac{50\,521\,\text{Cot}[a]}{362\,880} - \frac{3403\,\text{Cot}[a]^3}{3024} - \frac{203\,\text{Cot}[a]^5}{72} - \frac{17\,\text{Cot}[a]^7}{6} - \text{Cot}[a]^9\right)\text{Csc}[a] + (-a+x)^{10}$$
$$\left(\frac{50\,521}{3\,628\,800} + \frac{94\,723\,\text{Cot}[a]^2}{259\,200} + \frac{28\,121\,\text{Cot}[a]^4}{15\,120} + \frac{147\,\text{Cot}[a]^6}{40} + \frac{19\,\text{Cot}[a]^8}{6} + \text{Cot}[a]^{10}\right)\text{Csc}[a]$$

In[•]:=
```
Normal[Series[Cot[x], {x, a, 10}]]
```
normal serie cotangente

Out[•]=

$$\text{Cot}[a] + (-a+x)^3\left(-\frac{1}{3} - \frac{\text{Cot}[a]^2}{2} + \text{Cot}[a]\left(-\frac{5\,\text{Cot}[a]}{6} - \text{Cot}[a]^3\right)\right) + (-a+x)^4$$

$$\left(\frac{17\,\text{Cot}[a]}{24}+\text{Cot}[a]^3-\frac{1}{2}\,\text{Cot}[a]\,\left(\frac{1}{2}+\text{Cot}[a]^2\right)+\text{Cot}[a]\,\left(\frac{5}{24}+\frac{7\,\text{Cot}[a]^2}{6}+\text{Cot}[a]^4\right)\right)+$$

$$(-a+x)^5\left(-\frac{13}{60}-\frac{29\,\text{Cot}[a]^2}{24}-\text{Cot}[a]^4+\frac{1}{6}\,\left(\frac{1}{2}+\text{Cot}[a]^2\right)-\right.$$

$$\left.\frac{1}{2}\,\text{Cot}[a]\,\left(-\frac{5\,\text{Cot}[a]}{6}-\text{Cot}[a]^3\right)+\text{Cot}[a]\,\left(-\frac{61\,\text{Cot}[a]}{120}-\frac{3\,\text{Cot}[a]^3}{2}-\text{Cot}[a]^5\right)\right)+$$

$$(-a+x)^6\left(\frac{371\,\text{Cot}[a]}{720}+\frac{3\,\text{Cot}[a]^3}{2}+\text{Cot}[a]^5+\frac{1}{24}\,\text{Cot}[a]\,\left(\frac{1}{2}+\text{Cot}[a]^2\right)+\right.$$

$$\frac{1}{6}\,\left(-\frac{5\,\text{Cot}[a]}{6}-\text{Cot}[a]^3\right)-\frac{1}{2}\,\text{Cot}[a]\,\left(\frac{5}{24}+\frac{7\,\text{Cot}[a]^2}{6}+\text{Cot}[a]^4\right)+$$

$$\left.\text{Cot}[a]\,\left(\frac{61}{720}+\frac{331\,\text{Cot}[a]^2}{360}+\frac{11\,\text{Cot}[a]^4}{6}+\text{Cot}[a]^6\right)\right)+$$

$$(-a+x)^7\left(-\frac{71}{840}-\frac{661\,\text{Cot}[a]^2}{720}-\frac{11\,\text{Cot}[a]^4}{6}-\text{Cot}[a]^6+\frac{1}{120}\,\left(-\frac{1}{2}-\text{Cot}[a]^2\right)+\right.$$

$$\frac{1}{24}\,\text{Cot}[a]\,\left(-\frac{5\,\text{Cot}[a]}{6}-\text{Cot}[a]^3\right)+\frac{1}{6}\,\left(\frac{5}{24}+\frac{7\,\text{Cot}[a]^2}{6}+\text{Cot}[a]^4\right)-$$

$$\frac{1}{2}\,\text{Cot}[a]\,\left(-\frac{61\,\text{Cot}[a]}{120}-\frac{3\,\text{Cot}[a]^3}{2}-\text{Cot}[a]^5\right)+$$

$$\left.\text{Cot}[a]\,\left(-\frac{277\,\text{Cot}[a]}{1008}-\frac{173\,\text{Cot}[a]^3}{120}-\frac{13\,\text{Cot}[a]^5}{6}-\text{Cot}[a]^7\right)\right)+$$

$$(-a+x)^8\left(\frac{3691\,\text{Cot}[a]}{13\,440}+\frac{173\,\text{Cot}[a]^3}{120}+\frac{13\,\text{Cot}[a]^5}{6}+\text{Cot}[a]^7-\right.$$

$$\frac{1}{720}\,\text{Cot}[a]\,\left(\frac{1}{2}+\text{Cot}[a]^2\right)+\frac{1}{120}\,\left(\frac{5\,\text{Cot}[a]}{6}+\text{Cot}[a]^3\right)+$$

$$\frac{1}{24}\,\text{Cot}[a]\,\left(\frac{5}{24}+\frac{7\,\text{Cot}[a]^2}{6}+\text{Cot}[a]^4\right)+\frac{1}{6}\,\left(-\frac{61\,\text{Cot}[a]}{120}-\frac{3\,\text{Cot}[a]^3}{2}-\text{Cot}[a]^5\right)-$$

$$\frac{1}{2}\,\text{Cot}[a]\,\left(\frac{61}{720}+\frac{331\,\text{Cot}[a]^2}{360}+\frac{11\,\text{Cot}[a]^4}{6}+\text{Cot}[a]^6\right)+$$

$$\left.\text{Cot}[a]\,\left(\frac{277}{8064}+\frac{3071\,\text{Cot}[a]^2}{5040}+\frac{83\,\text{Cot}[a]^4}{40}+\frac{5\,\text{Cot}[a]^6}{2}+\text{Cot}[a]^8\right)\right)+$$

$$(-a+x)^9\left(-\frac{6233}{181\,440}-\frac{24\,569\,\text{Cot}[a]^2}{40\,320}-\frac{83\,\text{Cot}[a]^4}{40}-\frac{5\,\text{Cot}[a]^6}{2}-\text{Cot}[a]^8+\frac{\frac{1}{2}+\text{Cot}[a]^2}{5040}-\right.$$

$$\frac{1}{720}\,\text{Cot}[a]\,\left(-\frac{5\,\text{Cot}[a]}{6}-\text{Cot}[a]^3\right)+\frac{1}{120}\,\left(-\frac{5}{24}-\frac{7\,\text{Cot}[a]^2}{6}-\text{Cot}[a]^4\right)+\frac{1}{24}\,\text{Cot}[a]$$

$$\left(-\frac{61\,\text{Cot}[a]}{120}-\frac{3\,\text{Cot}[a]^3}{2}-\text{Cot}[a]^5\right)+\frac{1}{6}\,\left(\frac{61}{720}+\frac{331\,\text{Cot}[a]^2}{360}+\frac{11\,\text{Cot}[a]^4}{6}+\text{Cot}[a]^6\right)-$$

$$\frac{1}{2}\,\text{Cot}[a]\,\left(-\frac{277\,\text{Cot}[a]}{1008}-\frac{173\,\text{Cot}[a]^3}{120}-\frac{13\,\text{Cot}[a]^5}{6}-\text{Cot}[a]^7\right)+$$

$$\left.\text{Cot}[a]\,\left(-\frac{50\,521\,\text{Cot}[a]}{362\,880}-\frac{3403\,\text{Cot}[a]^3}{3024}-\frac{203\,\text{Cot}[a]^5}{72}-\frac{17\,\text{Cot}[a]^7}{6}-\text{Cot}[a]^9\right)\right)+$$

$$(-a+x)^{10}\left(\frac{505\,219\,\text{Cot}[a]}{3\,628\,800}+\frac{3403\,\text{Cot}[a]^3}{3024}+\frac{203\,\text{Cot}[a]^5}{72}+\frac{17\,\text{Cot}[a]^7}{6}+\right.$$

$$\text{Cot}[a]^9+\frac{\text{Cot}[a]\left(\frac{1}{2}+\text{Cot}[a]^2\right)}{40\,320}+\frac{-\frac{5\,\text{Cot}[a]}{6}-\text{Cot}[a]^3}{5040}-$$

$$\frac{1}{720}\,\text{Cot}[a]\left(\frac{5}{24}+\frac{7\,\text{Cot}[a]^2}{6}+\text{Cot}[a]^4\right)+\frac{1}{120}\left(\frac{61\,\text{Cot}[a]}{120}+\frac{3\,\text{Cot}[a]^3}{2}+\text{Cot}[a]^5\right)+$$

$$\frac{1}{24}\,\text{Cot}[a]\left(\frac{61}{720}+\frac{331\,\text{Cot}[a]^2}{360}+\frac{11\,\text{Cot}[a]^4}{6}+\text{Cot}[a]^6\right)+$$

$$\frac{1}{6}\left(-\frac{277\,\text{Cot}[a]}{1008}-\frac{173\,\text{Cot}[a]^3}{120}-\frac{13\,\text{Cot}[a]^5}{6}-\text{Cot}[a]^7\right)-$$

$$\frac{1}{2}\,\text{Cot}[a]\left(\frac{277}{8064}+\frac{3071\,\text{Cot}[a]^2}{5040}+\frac{83\,\text{Cot}[a]^4}{40}+\frac{5\,\text{Cot}[a]^6}{2}+\text{Cot}[a]^8\right)+\text{Cot}[a]$$

$$\left.\left(\frac{50\,521}{3\,628\,800}+\frac{94\,723\,\text{Cot}[a]^2}{259\,200}+\frac{28\,121\,\text{Cot}[a]^4}{15\,120}+\frac{147\,\text{Cot}[a]^6}{40}+\frac{19\,\text{Cot}[a]^8}{6}+\text{Cot}[a]^{10}\right)\right)-$$

$$(-a+x)\,\text{Csc}[a]^2+(-a+x)^2\,\text{Cot}[a]\,\text{Csc}[a]^2$$

■ *Funciones trigonométricas inversas*

In[•]:=
```
Normal[Series[ArcSin[x], {x, a, 10}]]
```
normal serie arco seno

Out[•]=

$$\frac{-a+x}{\sqrt{1-a^2}}+\frac{a\,(-a+x)^2}{2\left(1-a^2\right)^{3/2}}+\frac{\left(1+2\,a^2\right)(-a+x)^3}{6\left(1-a^2\right)^{5/2}}+\frac{a\left(3+2\,a^2\right)(-a+x)^4}{8\left(1-a^2\right)^{7/2}}+$$

$$\frac{\left(3+24\,a^2+8\,a^4\right)(-a+x)^5}{40\left(1-a^2\right)^{9/2}}+\frac{a\left(15+40\,a^2+8\,a^4\right)(-a+x)^6}{48\left(1-a^2\right)^{11/2}}+$$

$$\frac{\left(5+90\,a^2+120\,a^4+16\,a^6\right)(-a+x)^7}{112\left(1-a^2\right)^{13/2}}+\frac{a\left(35+210\,a^2+168\,a^4+16\,a^6\right)(-a+x)^8}{128\left(1-a^2\right)^{15/2}}+$$

$$\frac{\left(35+1120\,a^2+3360\,a^4+1792\,a^6+128\,a^8\right)(-a+x)^9}{1152\left(1-a^2\right)^{17/2}}-$$

$$\frac{a\left(315+3360\,a^2+6048\,a^4+2304\,a^6+128\,a^8\right)(-a+x)^{10}}{1280\sqrt{1-a^2}\left(-1+a^2\right)^9}+\text{ArcSin}[a]$$

In[•]:=
```
Normal[Series[ArcCos[x], {x, a, 10}]]
```
normal serie arco coseno

Out[•]=

$$-\frac{-a+x}{\sqrt{1-a^2}}-\frac{a\,(-a+x)^2}{2\left(1-a^2\right)^{3/2}}-\frac{\left(1+2a^2\right)\,(-a+x)^3}{6\left(1-a^2\right)^{5/2}}-\frac{a\left(3+2a^2\right)\,(-a+x)^4}{8\left(1-a^2\right)^{7/2}}-$$

$$\frac{\left(3+24a^2+8a^4\right)\,(-a+x)^5}{40\left(1-a^2\right)^{9/2}}-\frac{a\left(15+40a^2+8a^4\right)\,(-a+x)^6}{48\left(1-a^2\right)^{11/2}}-$$

$$\frac{\left(5+90a^2+120a^4+16a^6\right)\,(-a+x)^7}{112\left(1-a^2\right)^{13/2}}-\frac{a\left(35+210a^2+168a^4+16a^6\right)\,(-a+x)^8}{128\left(1-a^2\right)^{15/2}}-$$

$$\frac{\left(35+1120a^2+3360a^4+1792a^6+128a^8\right)\,(-a+x)^9}{1152\left(1-a^2\right)^{17/2}}+$$

$$\frac{a\left(315+3360a^2+6048a^4+2304a^6+128a^8\right)\,(-a+x)^{10}}{1280\sqrt{1-a^2}\,\left(-1+a^2\right)^9}+\text{ArcCos}[a]$$

In[•]:=
```
Normal[Series[ArcTan[x], {x, a, 10}]]
```
normal serie arco tangente

Out[•]=

$$\frac{-a+x}{1+a^2}-\frac{a\,(-a+x)^2}{\left(1+a^2\right)^2}+\frac{\left(\frac{4a^2}{\left(1+a^2\right)^2}-\frac{1}{1+a^2}\right)\,(-a+x)^3}{3\left(1+a^2\right)}+\frac{\left(-\frac{8a^3}{\left(1+a^2\right)^3}+\frac{4a}{\left(1+a^2\right)^2}\right)\,(-a+x)^4}{4\left(1+a^2\right)}+$$

$$\frac{\left(\frac{16a^4}{\left(1+a^2\right)^4}-\frac{12a^2}{\left(1+a^2\right)^3}+\frac{1}{\left(1+a^2\right)^2}\right)\,(-a+x)^5}{5\left(1+a^2\right)}+\frac{\left(-\frac{32a^5}{\left(1+a^2\right)^5}+\frac{32a^3}{\left(1+a^2\right)^4}-\frac{6a}{\left(1+a^2\right)^3}\right)\,(-a+x)^6}{6\left(1+a^2\right)}+$$

$$\frac{\left(\frac{64a^6}{\left(1+a^2\right)^6}-\frac{80a^4}{\left(1+a^2\right)^5}+\frac{24a^2}{\left(1+a^2\right)^4}-\frac{1}{\left(1+a^2\right)^3}\right)\,(-a+x)^7}{7\left(1+a^2\right)}+\frac{\left(-\frac{128a^7}{\left(1+a^2\right)^7}+\frac{192a^5}{\left(1+a^2\right)^6}-\frac{80a^3}{\left(1+a^2\right)^5}+\frac{8a}{\left(1+a^2\right)^4}\right)\,(-a+x)^8}{8\left(1+a^2\right)}+$$

$$\frac{\left(\frac{256a^8}{\left(1+a^2\right)^8}-\frac{448a^6}{\left(1+a^2\right)^7}+\frac{240a^4}{\left(1+a^2\right)^6}-\frac{40a^2}{\left(1+a^2\right)^5}+\frac{1}{\left(1+a^2\right)^4}\right)\,(-a+x)^9}{9\left(1+a^2\right)}+$$

$$\frac{\left(-\frac{512a^9}{\left(1+a^2\right)^9}+\frac{1024a^7}{\left(1+a^2\right)^8}-\frac{672a^5}{\left(1+a^2\right)^7}+\frac{160a^3}{\left(1+a^2\right)^6}-\frac{10a}{\left(1+a^2\right)^5}\right)\,(-a+x)^{10}}{10\left(1+a^2\right)}+\text{ArcTan}[a]$$

In[•]:=
```
Normal[Series[ArcSec[x], {x, a, 10}]]
```
normal serie arco secante

Out[•]=

$$\frac{-a+x}{\sqrt{1-\frac{1}{a^2}}\,a^2}+\frac{\left(1-2a^2\right)(-a+x)^2}{2a^3\left(-1+a^2\right)\sqrt{\frac{-1+a^2}{a^2}}}+\frac{1}{6}\left(\frac{3}{\left(1-\frac{1}{a^2}\right)^{5/2}a^8}+\frac{7}{\left(1-\frac{1}{a^2}\right)^{3/2}a^6}+\frac{6}{\sqrt{1-\frac{1}{a^2}}\,a^4}\right)(-a+x)^3+$$

$$\frac{1}{24}\left(-\frac{15}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{11}}-\frac{45}{\left(1-\frac{1}{a^2}\right)^{5/2}a^9}-\frac{48}{\left(1-\frac{1}{a^2}\right)^{3/2}a^7}-\frac{24}{\sqrt{1-\frac{1}{a^2}}\,a^5}\right)(-a+x)^4+$$

$$\frac{1}{120}\left(\frac{105}{\left(1-\frac{1}{a^2}\right)^{9/2}a^{14}}+\frac{390}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{12}}+\frac{549}{\left(1-\frac{1}{a^2}\right)^{5/2}a^{10}}+\frac{360}{\left(1-\frac{1}{a^2}\right)^{3/2}a^8}+\frac{120}{\sqrt{1-\frac{1}{a^2}}\,a^6}\right)(-a+x)^5+$$

$$\frac{1}{720}\left(-\frac{945}{\left(1-\frac{1}{a^2}\right)^{11/2}a^{17}}-\frac{4200}{\left(1-\frac{1}{a^2}\right)^{9/2}a^{15}}-\frac{7425}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{13}}-\right.$$

$$\left.\frac{6570}{\left(1-\frac{1}{a^2}\right)^{5/2}a^{11}}-\frac{3000}{\left(1-\frac{1}{a^2}\right)^{3/2}a^9}-\frac{720}{\sqrt{1-\frac{1}{a^2}}\,a^7}\right)(-a+x)^6+$$

$$\frac{\left(\frac{10\,395}{\left(1-\frac{1}{a^2}\right)^{13/2}a^{20}}+\frac{53\,865}{\left(1-\frac{1}{a^2}\right)^{11/2}a^{18}}+\frac{114\,975}{\left(1-\frac{1}{a^2}\right)^{9/2}a^{16}}+\frac{129\,375}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{14}}+\frac{81\,270}{\left(1-\frac{1}{a^2}\right)^{5/2}a^{12}}+\frac{27\,720}{\left(1-\frac{1}{a^2}\right)^{3/2}a^{10}}+\frac{5040}{\sqrt{1-\frac{1}{a^2}}\,a^8}\right)(-a+x)^7}{5040}+$$

$$\frac{1}{40\,320}\left(-\frac{135\,135}{\left(1-\frac{1}{a^2}\right)^{15/2}a^{23}}-\frac{800\,415}{\left(1-\frac{1}{a^2}\right)^{13/2}a^{21}}-\frac{2\,004\,345}{\left(1-\frac{1}{a^2}\right)^{11/2}a^{19}}-\frac{2\,745\,225}{\left(1-\frac{1}{a^2}\right)^{9/2}a^{17}}-\right.$$

$$\left.\frac{2\,217\,600}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{15}}-\frac{1\,058\,400}{\left(1-\frac{1}{a^2}\right)^{5/2}a^{13}}-\frac{282\,240}{\left(1-\frac{1}{a^2}\right)^{3/2}a^{11}}-\frac{40\,320}{\sqrt{1-\frac{1}{a^2}}\,a^9}\right)(-a+x)^8+\frac{1}{362\,880}$$

$$\left(\frac{2\,027\,025}{\left(1-\frac{1}{a^2}\right)^{17/2}a^{26}}+\frac{13\,513\,500}{\left(1-\frac{1}{a^2}\right)^{15/2}a^{24}}+\frac{38\,856\,510}{\left(1-\frac{1}{a^2}\right)^{13/2}a^{22}}+\frac{62\,789\,580}{\left(1-\frac{1}{a^2}\right)^{11/2}a^{20}}+\frac{62\,192\,025}{\left(1-\frac{1}{a^2}\right)^{9/2}a^{18}}+\right.$$

$$\left.\frac{38\,556\,000}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{16}}+\frac{14\,605\,920}{\left(1-\frac{1}{a^2}\right)^{5/2}a^{14}}+\frac{3\,144\,960}{\left(1-\frac{1}{a^2}\right)^{3/2}a^{12}}+\frac{362\,880}{\sqrt{1-\frac{1}{a^2}}\,a^{10}}\right)(-a+x)^9-$$

$$\left(\left(-128+1216\,a^2-5168\,a^4+12\,920\,a^6-20\,995\,a^8+23\,126\,a^{10}-16\,032\,a^{12}+14\,016\,a^{14}+\right.\right.$$

$$\left.\left.1920\,a^{16}+1280\,a^{18}\right)(-a+x)^{10}\right)\Big/\left(1280\,a^{11}\left(-1+a^2\right)^9\sqrt{\frac{-1+a^2}{a^2}}\right)+\text{ArcSec}[a]$$

In[•]:=
```
Normal[Series[ArcCsc[x], {x, a, 10}]]
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normal serie arco cosecante

Out[•]=

$$-\frac{-a+x}{\sqrt{1-\frac{1}{a^2}}\,a^2}+\frac{\left(-1+2a^2\right)(-a+x)^2}{2a^3\left(-1+a^2\right)\sqrt{\frac{-1+a^2}{a^2}}}+\frac{1}{6}\left(-\frac{3}{\left(1-\frac{1}{a^2}\right)^{5/2}a^8}-\frac{7}{\left(1-\frac{1}{a^2}\right)^{3/2}a^6}-\frac{6}{\sqrt{1-\frac{1}{a^2}}\,a^4}\right)(-a+x)^3+$$

$$\frac{1}{24}\left(\frac{15}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{11}}+\frac{45}{\left(1-\frac{1}{a^2}\right)^{5/2}a^9}+\frac{48}{\left(1-\frac{1}{a^2}\right)^{3/2}a^7}+\frac{24}{\sqrt{1-\frac{1}{a^2}}\,a^5}\right)(-a+x)^4+$$

$$\frac{1}{120}\left(-\frac{105}{\left(1-\frac{1}{a^2}\right)^{9/2}a^{14}}-\frac{390}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{12}}-\frac{549}{\left(1-\frac{1}{a^2}\right)^{5/2}a^{10}}-\frac{360}{\left(1-\frac{1}{a^2}\right)^{3/2}a^8}-\frac{120}{\sqrt{1-\frac{1}{a^2}}\,a^6}\right)(-a+x)^5+$$

$$\frac{1}{720}\left(\frac{945}{\left(1-\frac{1}{a^2}\right)^{11/2}a^{17}}+\frac{4200}{\left(1-\frac{1}{a^2}\right)^{9/2}a^{15}}+\frac{7425}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{13}}+\right.$$

$$\left.\frac{6570}{\left(1-\frac{1}{a^2}\right)^{5/2}a^{11}}+\frac{3000}{\left(1-\frac{1}{a^2}\right)^{3/2}a^9}+\frac{720}{\sqrt{1-\frac{1}{a^2}}\,a^7}\right)(-a+x)^6+$$

$$\frac{\left(-\frac{10\,395}{\left(1-\frac{1}{a^2}\right)^{13/2}a^{20}}-\frac{53\,865}{\left(1-\frac{1}{a^2}\right)^{11/2}a^{18}}-\frac{114\,975}{\left(1-\frac{1}{a^2}\right)^{9/2}a^{16}}-\frac{129\,375}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{14}}-\frac{81\,270}{\left(1-\frac{1}{a^2}\right)^{5/2}a^{12}}-\frac{27\,720}{\left(1-\frac{1}{a^2}\right)^{3/2}a^{10}}-\frac{5040}{\sqrt{1-\frac{1}{a^2}}\,a^8}\right)(-a+x)^7}{5040}+$$

$$\frac{1}{40\,320}\left(\frac{135\,135}{\left(1-\frac{1}{a^2}\right)^{15/2}a^{23}}+\frac{800\,415}{\left(1-\frac{1}{a^2}\right)^{13/2}a^{21}}+\frac{2\,004\,345}{\left(1-\frac{1}{a^2}\right)^{11/2}a^{19}}+\frac{2\,745\,225}{\left(1-\frac{1}{a^2}\right)^{9/2}a^{17}}+\right.$$

$$\left.\frac{2\,217\,600}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{15}}+\frac{1\,058\,400}{\left(1-\frac{1}{a^2}\right)^{5/2}a^{13}}+\frac{282\,240}{\left(1-\frac{1}{a^2}\right)^{3/2}a^{11}}+\frac{40\,320}{\sqrt{1-\frac{1}{a^2}}\,a^9}\right)(-a+x)^8+\frac{1}{362\,880}$$

$$\left(-\frac{2\,027\,025}{\left(1-\frac{1}{a^2}\right)^{17/2}a^{26}}-\frac{13\,513\,500}{\left(1-\frac{1}{a^2}\right)^{15/2}a^{24}}-\frac{38\,856\,510}{\left(1-\frac{1}{a^2}\right)^{13/2}a^{22}}-\frac{62\,789\,580}{\left(1-\frac{1}{a^2}\right)^{11/2}a^{20}}-\frac{62\,192\,025}{\left(1-\frac{1}{a^2}\right)^{9/2}a^{18}}-\right.$$

$$\left.\frac{38\,556\,000}{\left(1-\frac{1}{a^2}\right)^{7/2}a^{16}}-\frac{14\,605\,920}{\left(1-\frac{1}{a^2}\right)^{5/2}a^{14}}-\frac{3\,144\,960}{\left(1-\frac{1}{a^2}\right)^{3/2}a^{12}}-\frac{362\,880}{\sqrt{1-\frac{1}{a^2}}\,a^{10}}\right)(-a+x)^9+$$

$$\left(\left(-128+1216\,a^2-5168\,a^4+12\,920\,a^6-20\,995\,a^8+23\,126\,a^{10}-16\,032\,a^{12}+14\,016\,a^{14}+\right.\right.$$

$$\left.\left.1920\,a^{16}+1280\,a^{18}\right)(-a+x)^{10}\right)\Big/\left(1280\,a^{11}\left(-1+a^2\right)^9\sqrt{\frac{-1+a^2}{a^2}}\right)+\text{ArcCsc}[a]$$

In[•]:=
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Normal[Series[ArcCot[x], {x, a, 10}]]
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normal serie arco cotangente

Out[•]=

$$\frac{-a+x}{-1-a^2}+\frac{a(-a+x)^2}{\left(1+a^2\right)^2}+\frac{1}{3}\left(\frac{4}{\left(1+\frac{1}{a^2}\right)^2a^6}-\frac{3}{\left(1+\frac{1}{a^2}\right)a^4}-\frac{\frac{4}{\left(1+\frac{1}{a^2}\right)^2a^6}-\frac{3}{\left(1+\frac{1}{a^2}\right)a^4}}{\left(1+\frac{1}{a^2}\right)a^2}\right)(-a+x)^3+$$

$$\frac{1}{4}\left(-\frac{6}{\left(1+\frac{1}{a^2}\right)^2 a^7}+\frac{4}{\left(1+\frac{1}{a^2}\right) a^5}+\frac{2\left(\frac{4}{\left(1+\frac{1}{a^2}\right)^2 a^6}-\frac{3}{\left(1+\frac{1}{a^2}\right) a^4}\right)}{\left(1+\frac{1}{a^2}\right) a^3}-\frac{\frac{8}{\left(1+\frac{1}{a^2}\right)^3 a^9}-\frac{12}{\left(1+\frac{1}{a^2}\right)^2 a^7}+\frac{4}{\left(1+\frac{1}{a^2}\right) a^5}}{\left(1+\frac{1}{a^2}\right) a^2}\right)$$

$$(-a+x)^4+\frac{1}{5}\left(\frac{8}{\left(1+\frac{1}{a^2}\right)^2 a^8}-\frac{5}{\left(1+\frac{1}{a^2}\right) a^6}-\frac{3\left(\frac{4}{\left(1+\frac{1}{a^2}\right)^2 a^6}-\frac{3}{\left(1+\frac{1}{a^2}\right) a^4}\right)}{\left(1+\frac{1}{a^2}\right) a^4}+\right.$$

$$\left.\frac{2\left(\frac{8}{\left(1+\frac{1}{a^2}\right)^3 a^9}-\frac{12}{\left(1+\frac{1}{a^2}\right)^2 a^7}+\frac{4}{\left(1+\frac{1}{a^2}\right) a^5}\right)}{\left(1+\frac{1}{a^2}\right) a^3}-\frac{\frac{16}{\left(1+\frac{1}{a^2}\right)^4 a^{12}}-\frac{36}{\left(1+\frac{1}{a^2}\right)^3 a^{10}}+\frac{25}{\left(1+\frac{1}{a^2}\right)^2 a^8}-\frac{5}{\left(1+\frac{1}{a^2}\right) a^6}}{\left(1+\frac{1}{a^2}\right) a^2}\right)(-a+x)^5+$$

$$\frac{1}{6}\left(-\frac{10}{\left(1+\frac{1}{a^2}\right)^2 a^9}+\frac{6}{\left(1+\frac{1}{a^2}\right) a^7}+\frac{4\left(\frac{4}{\left(1+\frac{1}{a^2}\right)^2 a^6}-\frac{3}{\left(1+\frac{1}{a^2}\right) a^4}\right)}{\left(1+\frac{1}{a^2}\right) a^5}-\frac{3\left(\frac{8}{\left(1+\frac{1}{a^2}\right)^3 a^9}-\frac{12}{\left(1+\frac{1}{a^2}\right)^2 a^7}+\frac{4}{\left(1+\frac{1}{a^2}\right) a^5}\right)}{\left(1+\frac{1}{a^2}\right) a^4}+\right.$$

$$\frac{2\left(\frac{16}{\left(1+\frac{1}{a^2}\right)^4 a^{12}}-\frac{36}{\left(1+\frac{1}{a^2}\right)^3 a^{10}}+\frac{25}{\left(1+\frac{1}{a^2}\right)^2 a^8}-\frac{5}{\left(1+\frac{1}{a^2}\right) a^6}\right)}{\left(1+\frac{1}{a^2}\right) a^3}-$$

$$\left.\frac{\frac{32}{\left(1+\frac{1}{a^2}\right)^5 a^{15}}-\frac{96}{\left(1+\frac{1}{a^2}\right)^4 a^{13}}+\frac{102}{\left(1+\frac{1}{a^2}\right)^3 a^{11}}-\frac{44}{\left(1+\frac{1}{a^2}\right)^2 a^9}+\frac{6}{\left(1+\frac{1}{a^2}\right) a^7}}{\left(1+\frac{1}{a^2}\right) a^2}\right)(-a+x)^6+$$

$$\frac{1}{7}\left(\frac{12}{\left(1+\frac{1}{a^2}\right)^2 a^{10}}-\frac{7}{\left(1+\frac{1}{a^2}\right) a^8}-\frac{5\left(\frac{4}{\left(1+\frac{1}{a^2}\right)^2 a^6}-\frac{3}{\left(1+\frac{1}{a^2}\right) a^4}\right)}{\left(1+\frac{1}{a^2}\right) a^6}+\frac{4\left(\frac{8}{\left(1+\frac{1}{a^2}\right)^3 a^9}-\frac{12}{\left(1+\frac{1}{a^2}\right)^2 a^7}+\frac{4}{\left(1+\frac{1}{a^2}\right) a^5}\right)}{\left(1+\frac{1}{a^2}\right) a^5}-\right.$$

$$\frac{3\left(\frac{16}{\left(1+\frac{1}{a^2}\right)^4 a^{12}}-\frac{36}{\left(1+\frac{1}{a^2}\right)^3 a^{10}}+\frac{25}{\left(1+\frac{1}{a^2}\right)^2 a^8}-\frac{5}{\left(1+\frac{1}{a^2}\right) a^6}\right)}{\left(1+\frac{1}{a^2}\right) a^4}+$$

$$\frac{2\left(\frac{32}{\left(1+\frac{1}{a^2}\right)^5 a^{15}}-\frac{96}{\left(1+\frac{1}{a^2}\right)^4 a^{13}}+\frac{102}{\left(1+\frac{1}{a^2}\right)^3 a^{11}}-\frac{44}{\left(1+\frac{1}{a^2}\right)^2 a^9}+\frac{6}{\left(1+\frac{1}{a^2}\right) a^7}\right)}{\left(1+\frac{1}{a^2}\right) a^3}-$$

$$\left.\frac{\frac{64}{\left(1+\frac{1}{a^2}\right)^6 a^{18}}-\frac{240}{\left(1+\frac{1}{a^2}\right)^5 a^{16}}+\frac{344}{\left(1+\frac{1}{a^2}\right)^4 a^{14}}-\frac{231}{\left(1+\frac{1}{a^2}\right)^3 a^{12}}+\frac{70}{\left(1+\frac{1}{a^2}\right)^2 a^{10}}-\frac{7}{\left(1+\frac{1}{a^2}\right) a^8}}{\left(1+\frac{1}{a^2}\right) a^2}\right)(-a+x)^7+$$

$$\frac{1}{8}\left(-\frac{14}{\left(1+\frac{1}{a^2}\right)^2 a^{11}}+\frac{8}{\left(1+\frac{1}{a^2}\right) a^9}+\frac{6\left(\frac{4}{\left(1+\frac{1}{a^2}\right)^2 a^6}-\frac{3}{\left(1+\frac{1}{a^2}\right) a^4}\right)}{\left(1+\frac{1}{a^2}\right) a^7}-\frac{5\left(\frac{8}{\left(1+\frac{1}{a^2}\right)^3 a^9}-\frac{12}{\left(1+\frac{1}{a^2}\right)^2 a^7}+\frac{4}{\left(1+\frac{1}{a^2}\right) a^5}\right)}{\left(1+\frac{1}{a^2}\right) a^6}+\right.$$

$$\frac{4\left(\frac{16}{\left(1+\frac{1}{a^2}\right)^4 a^{12}}-\frac{36}{\left(1+\frac{1}{a^2}\right)^3 a^{10}}+\frac{25}{\left(1+\frac{1}{a^2}\right)^2 a^8}-\frac{5}{\left(1+\frac{1}{a^2}\right) a^6}\right)}{\left(1+\frac{1}{a^2}\right) a^5}-$$

$$\frac{3\left(\frac{32}{\left(1+\frac{1}{a^2}\right)^5 a^{15}}-\frac{96}{\left(1+\frac{1}{a^2}\right)^4 a^{13}}+\frac{102}{\left(1+\frac{1}{a^2}\right)^3 a^{11}}-\frac{44}{\left(1+\frac{1}{a^2}\right)^2 a^9}+\frac{6}{\left(1+\frac{1}{a^2}\right) a^7}\right)}{\left(1+\frac{1}{a^2}\right) a^4}+$$

$$\frac{2\left(\frac{64}{\left(1+\frac{1}{a^2}\right)^6 a^{18}}-\frac{240}{\left(1+\frac{1}{a^2}\right)^5 a^{16}}+\frac{344}{\left(1+\frac{1}{a^2}\right)^4 a^{14}}-\frac{231}{\left(1+\frac{1}{a^2}\right)^3 a^{12}}+\frac{70}{\left(1+\frac{1}{a^2}\right)^2 a^{10}}-\frac{7}{\left(1+\frac{1}{a^2}\right) a^8}\right)}{\left(1+\frac{1}{a^2}\right) a^3}-$$

$$\left.\frac{\frac{128}{\left(1+\frac{1}{a^2}\right)^7 a^{21}}-\frac{576}{\left(1+\frac{1}{a^2}\right)^6 a^{19}}+\frac{1040}{\left(1+\frac{1}{a^2}\right)^5 a^{17}}-\frac{952}{\left(1+\frac{1}{a^2}\right)^4 a^{15}}+\frac{456}{\left(1+\frac{1}{a^2}\right)^3 a^{13}}-\frac{104}{\left(1+\frac{1}{a^2}\right)^2 a^{11}}+\frac{8}{\left(1+\frac{1}{a^2}\right) a^9}}{\left(1+\frac{1}{a^2}\right) a^2}\right)(-a+x)^8+$$

$$\frac{1}{9}\left(\frac{16}{\left(1+\frac{1}{a^2}\right)^2 a^{12}}-\frac{9}{\left(1+\frac{1}{a^2}\right) a^{10}}-\frac{7\left(\frac{4}{\left(1+\frac{1}{a^2}\right)^2 a^6}-\frac{3}{\left(1+\frac{1}{a^2}\right) a^4}\right)}{\left(1+\frac{1}{a^2}\right) a^8}+\frac{6\left(\frac{8}{\left(1+\frac{1}{a^2}\right)^3 a^9}-\frac{12}{\left(1+\frac{1}{a^2}\right)^2 a^7}+\frac{4}{\left(1+\frac{1}{a^2}\right) a^5}\right)}{\left(1+\frac{1}{a^2}\right) a^7}-\right.$$

$$\frac{5\left(\frac{16}{\left(1+\frac{1}{a^2}\right)^4 a^{12}}-\frac{36}{\left(1+\frac{1}{a^2}\right)^3 a^{10}}+\frac{25}{\left(1+\frac{1}{a^2}\right)^2 a^8}-\frac{5}{\left(1+\frac{1}{a^2}\right) a^6}\right)}{\left(1+\frac{1}{a^2}\right) a^6}+$$

$$\frac{4\left(\frac{32}{\left(1+\frac{1}{a^2}\right)^5 a^{15}}-\frac{96}{\left(1+\frac{1}{a^2}\right)^4 a^{13}}+\frac{102}{\left(1+\frac{1}{a^2}\right)^3 a^{11}}-\frac{44}{\left(1+\frac{1}{a^2}\right)^2 a^9}+\frac{6}{\left(1+\frac{1}{a^2}\right) a^7}\right)}{\left(1+\frac{1}{a^2}\right) a^5}-$$

$$\frac{3\left(\frac{64}{\left(1+\frac{1}{a^2}\right)^6 a^{18}}-\frac{240}{\left(1+\frac{1}{a^2}\right)^5 a^{16}}+\frac{344}{\left(1+\frac{1}{a^2}\right)^4 a^{14}}-\frac{231}{\left(1+\frac{1}{a^2}\right)^3 a^{12}}+\frac{70}{\left(1+\frac{1}{a^2}\right)^2 a^{10}}-\frac{7}{\left(1+\frac{1}{a^2}\right) a^8}\right)}{\left(1+\frac{1}{a^2}\right) a^4}+$$

$$\frac{2\left(\frac{128}{\left(1+\frac{1}{a^2}\right)^7 a^{21}}-\frac{576}{\left(1+\frac{1}{a^2}\right)^6 a^{19}}+\frac{1040}{\left(1+\frac{1}{a^2}\right)^5 a^{17}}-\frac{952}{\left(1+\frac{1}{a^2}\right)^4 a^{15}}+\frac{456}{\left(1+\frac{1}{a^2}\right)^3 a^{13}}-\frac{104}{\left(1+\frac{1}{a^2}\right)^2 a^{11}}+\frac{8}{\left(1+\frac{1}{a^2}\right) a^9}\right)}{\left(1+\frac{1}{a^2}\right) a^3}-$$

$$\frac{\frac{256}{\left(1+\frac{1}{a^2}\right)^8 a^{24}}-\frac{1344}{\left(1+\frac{1}{a^2}\right)^7 a^{22}}+\frac{2928}{\left(1+\frac{1}{a^2}\right)^6 a^{20}}-\frac{3400}{\left(1+\frac{1}{a^2}\right)^5 a^{18}}+\frac{2241}{\left(1+\frac{1}{a^2}\right)^4 a^{16}}-\frac{819}{\left(1+\frac{1}{a^2}\right)^3 a^{14}}+\frac{147}{\left(1+\frac{1}{a^2}\right)^2 a^{12}}-\frac{9}{\left(1+\frac{1}{a^2}\right) a^{10}}}{\left(1+\frac{1}{a^2}\right) a^2}\Bigg)$$

$$(-a+x)^9+\frac{1}{10}\left(-\frac{18}{\left(1+\frac{1}{a^2}\right)^2 a^{13}}+\frac{10}{\left(1+\frac{1}{a^2}\right) a^{11}}+\frac{8\left(\frac{4}{\left(1+\frac{1}{a^2}\right)^2 a^6}-\frac{3}{\left(1+\frac{1}{a^2}\right) a^4}\right)}{\left(1+\frac{1}{a^2}\right) a^9}-\right.$$

$$\frac{7\left(\frac{8}{\left(1+\frac{1}{a^2}\right)^3 a^9}-\frac{12}{\left(1+\frac{1}{a^2}\right)^2 a^7}+\frac{4}{\left(1+\frac{1}{a^2}\right) a^5}\right)}{\left(1+\frac{1}{a^2}\right) a^8}+\frac{6\left(\frac{16}{\left(1+\frac{1}{a^2}\right)^4 a^{12}}-\frac{36}{\left(1+\frac{1}{a^2}\right)^3 a^{10}}+\frac{25}{\left(1+\frac{1}{a^2}\right)^2 a^8}-\frac{5}{\left(1+\frac{1}{a^2}\right) a^6}\right)}{\left(1+\frac{1}{a^2}\right) a^7}-$$

$$\frac{5\left(\frac{32}{\left(1+\frac{1}{a^2}\right)^5 a^{15}}-\frac{96}{\left(1+\frac{1}{a^2}\right)^4 a^{13}}+\frac{102}{\left(1+\frac{1}{a^2}\right)^3 a^{11}}-\frac{44}{\left(1+\frac{1}{a^2}\right)^2 a^9}+\frac{6}{\left(1+\frac{1}{a^2}\right) a^7}\right)}{\left(1+\frac{1}{a^2}\right) a^6}+$$

$$\frac{4\left(\frac{64}{\left(1+\frac{1}{a^2}\right)^6 a^{18}}-\frac{240}{\left(1+\frac{1}{a^2}\right)^5 a^{16}}+\frac{344}{\left(1+\frac{1}{a^2}\right)^4 a^{14}}-\frac{231}{\left(1+\frac{1}{a^2}\right)^3 a^{12}}+\frac{70}{\left(1+\frac{1}{a^2}\right)^2 a^{10}}-\frac{7}{\left(1+\frac{1}{a^2}\right) a^8}\right)}{\left(1+\frac{1}{a^2}\right) a^5}-$$

$$\frac{3\left(\frac{128}{\left(1+\frac{1}{a^2}\right)^7 a^{21}}-\frac{576}{\left(1+\frac{1}{a^2}\right)^6 a^{19}}+\frac{1040}{\left(1+\frac{1}{a^2}\right)^5 a^{17}}-\frac{952}{\left(1+\frac{1}{a^2}\right)^4 a^{15}}+\frac{456}{\left(1+\frac{1}{a^2}\right)^3 a^{13}}-\frac{104}{\left(1+\frac{1}{a^2}\right)^2 a^{11}}+\frac{8}{\left(1+\frac{1}{a^2}\right) a^9}\right)}{\left(1+\frac{1}{a^2}\right) a^4}+$$

$$\frac{2\left(\frac{256}{\left(1+\frac{1}{a^2}\right)^8 a^{24}}-\frac{1344}{\left(1+\frac{1}{a^2}\right)^7 a^{22}}+\frac{2928}{\left(1+\frac{1}{a^2}\right)^6 a^{20}}-\frac{3400}{\left(1+\frac{1}{a^2}\right)^5 a^{18}}+\frac{2241}{\left(1+\frac{1}{a^2}\right)^4 a^{16}}-\frac{819}{\left(1+\frac{1}{a^2}\right)^3 a^{14}}+\frac{147}{\left(1+\frac{1}{a^2}\right)^2 a^{12}}-\frac{9}{\left(1+\frac{1}{a^2}\right) a^{10}}\right)}{\left(1+\frac{1}{a^2}\right) a^3}-$$

$$\frac{1}{\left(1+\frac{1}{a^2}\right) a^2}\left(\frac{512}{\left(1+\frac{1}{a^2}\right)^9 a^{27}}-\frac{3072}{\left(1+\frac{1}{a^2}\right)^8 a^{25}}+\frac{7840}{\left(1+\frac{1}{a^2}\right)^7 a^{23}}-\frac{11040}{\left(1+\frac{1}{a^2}\right)^6 a^{21}}+\frac{9290}{\left(1+\frac{1}{a^2}\right)^5 a^{19}}-\right.$$

$$\left.\left.\frac{4712}{\left(1+\frac{1}{a^2}\right)^4 a^{17}}+\frac{1372}{\left(1+\frac{1}{a^2}\right)^3 a^{15}}-\frac{200}{\left(1+\frac{1}{a^2}\right)^2 a^{13}}+\frac{10}{\left(1+\frac{1}{a^2}\right) a^{11}}\right)\right)(-a+x)^{10}+\text{ArcTan}\left[\frac{1}{a}\right]$$

Funciones trigonométricas hiperbólicas

In[•]:=
```
Normal[Series[Sinh[x], {x, a, 10}]]
```
normal serie seno hiperbólico

Out[•]=
$$(-a+x)\,\text{Cosh}[a]+\frac{1}{6}(-a+x)^3\,\text{Cosh}[a]+\frac{1}{120}(-a+x)^5\,\text{Cosh}[a]+\frac{(-a+x)^7\,\text{Cosh}[a]}{5040}+\frac{(-a+x)^9\,\text{Cosh}[a]}{362\,880}+\text{Sinh}[a]+\frac{1}{2}(-a+x)^2\,\text{Sinh}[a]+\frac{1}{24}(-a+x)^4\,\text{Sinh}[a]+\frac{1}{720}(-a+x)^6\,\text{Sinh}[a]+\frac{(-a+x)^8\,\text{Sinh}[a]}{40\,320}+\frac{(-a+x)^{10}\,\text{Sinh}[a]}{3\,628\,800}$$

In[•]:=
```
Normal[Series[Cosh[x], {x, a, 10}]]
```
normal serie coseno hiperbólico

Out[•]=
$$\text{Cosh}[a]+\frac{1}{2}(-a+x)^2\,\text{Cosh}[a]+\frac{1}{24}(-a+x)^4\,\text{Cosh}[a]+\frac{1}{720}(-a+x)^6\,\text{Cosh}[a]+\frac{(-a+x)^8\,\text{Cosh}[a]}{40\,320}+\frac{(-a+x)^{10}\,\text{Cosh}[a]}{3\,628\,800}+(-a+x)\,\text{Sinh}[a]+\frac{1}{6}(-a+x)^3\,\text{Sinh}[a]+\frac{1}{120}(-a+x)^5\,\text{Sinh}[a]+\frac{(-a+x)^7\,\text{Sinh}[a]}{5040}+\frac{(-a+x)^9\,\text{Sinh}[a]}{362\,880}$$

In[•]:=
```
Normal[Series[Tanh[x], {x, a, 10}]]
```
normal serie tangente hiperbólica

Out[•]=
$$\begin{aligned}&(-a+x)\,\text{Sech}[a]^2+\text{Tanh}[a]-(-a+x)^2\,\text{Sech}[a]^2\,\text{Tanh}[a]+\\&(-a+x)^3\left(-\frac{1}{3}+\frac{\text{Tanh}[a]^2}{2}+\text{Tanh}[a]\left(\frac{5\,\text{Tanh}[a]}{6}-\text{Tanh}[a]^3\right)\right)+\\&(-a+x)^4\left(\frac{17\,\text{Tanh}[a]}{24}-\text{Tanh}[a]^3+\right.\\&\quad\left.\frac{1}{2}\,\text{Tanh}[a]\left(-\frac{1}{2}+\text{Tanh}[a]^2\right)+\text{Tanh}[a]\left(\frac{5}{24}-\frac{7\,\text{Tanh}[a]^2}{6}+\text{Tanh}[a]^4\right)\right)+\\&(-a+x)^5\left(\frac{13}{60}-\frac{29\,\text{Tanh}[a]^2}{24}+\text{Tanh}[a]^4+\frac{1}{6}\left(-\frac{1}{2}+\text{Tanh}[a]^2\right)+\right.\\&\quad\left.\frac{1}{2}\,\text{Tanh}[a]\left(\frac{5\,\text{Tanh}[a]}{6}-\text{Tanh}[a]^3\right)+\text{Tanh}[a]\left(-\frac{61\,\text{Tanh}[a]}{120}+\frac{3\,\text{Tanh}[a]^3}{2}-\text{Tanh}[a]^5\right)\right)+\\&(-a+x)^6\left(-\frac{371\,\text{Tanh}[a]}{720}+\frac{3\,\text{Tanh}[a]^3}{2}-\text{Tanh}[a]^5+\frac{1}{24}\,\text{Tanh}[a]\left(-\frac{1}{2}+\text{Tanh}[a]^2\right)+\right.\\&\quad\frac{1}{6}\left(\frac{5\,\text{Tanh}[a]}{6}-\text{Tanh}[a]^3\right)+\frac{1}{2}\,\text{Tanh}[a]\left(\frac{5}{24}-\frac{7\,\text{Tanh}[a]^2}{6}+\text{Tanh}[a]^4\right)+\\&\quad\left.\text{Tanh}[a]\left(-\frac{61}{720}+\frac{331\,\text{Tanh}[a]^2}{360}-\frac{11\,\text{Tanh}[a]^4}{6}+\text{Tanh}[a]^6\right)\right)+\\&(-a+x)^7\left(-\frac{71}{840}+\frac{661\,\text{Tanh}[a]^2}{720}-\frac{11\,\text{Tanh}[a]^4}{6}+\text{Tanh}[a]^6+\frac{1}{120}\left(-\frac{1}{2}+\text{Tanh}[a]^2\right)+\right.\\&\quad\frac{1}{24}\,\text{Tanh}[a]\left(\frac{5\,\text{Tanh}[a]}{6}-\text{Tanh}[a]^3\right)+\frac{1}{6}\left(\frac{5}{24}-\frac{7\,\text{Tanh}[a]^2}{6}+\text{Tanh}[a]^4\right)+\end{aligned}$$

$$\frac{1}{2}\,\text{Tanh}[a]\left(-\frac{61\,\text{Tanh}[a]}{120}+\frac{3\,\text{Tanh}[a]^3}{2}-\text{Tanh}[a]^5\right)+$$

$$\text{Tanh}[a]\left(\frac{277\,\text{Tanh}[a]}{1008}-\frac{173\,\text{Tanh}[a]^3}{120}+\frac{13\,\text{Tanh}[a]^5}{6}-\text{Tanh}[a]^7\right)\Bigg)+$$

$$(-a+x)^8\left(\frac{3691\,\text{Tanh}[a]}{13\,440}-\frac{173\,\text{Tanh}[a]^3}{120}+\frac{13\,\text{Tanh}[a]^5}{6}-\text{Tanh}[a]^7+\right.$$

$$\frac{1}{720}\,\text{Tanh}[a]\left(-\frac{1}{2}+\text{Tanh}[a]^2\right)+\frac{1}{120}\left(\frac{5\,\text{Tanh}[a]}{6}-\text{Tanh}[a]^3\right)+$$

$$\frac{1}{24}\,\text{Tanh}[a]\left(\frac{5}{24}-\frac{7\,\text{Tanh}[a]^2}{6}+\text{Tanh}[a]^4\right)+\frac{1}{6}\left(-\frac{61\,\text{Tanh}[a]}{120}+\frac{3\,\text{Tanh}[a]^3}{2}-\text{Tanh}[a]^5\right)+$$

$$\frac{1}{2}\,\text{Tanh}[a]\left(-\frac{61}{720}+\frac{331\,\text{Tanh}[a]^2}{360}-\frac{11\,\text{Tanh}[a]^4}{6}+\text{Tanh}[a]^6\right)+$$

$$\text{Tanh}[a]\left(\frac{277}{8064}-\frac{3071\,\text{Tanh}[a]^2}{5040}+\frac{83\,\text{Tanh}[a]^4}{40}-\frac{5\,\text{Tanh}[a]^6}{2}+\text{Tanh}[a]^8\right)\Bigg)+$$

$$(-a+x)^9\left(\frac{6233}{181\,440}-\frac{24\,569\,\text{Tanh}[a]^2}{40\,320}+\frac{83\,\text{Tanh}[a]^4}{40}-\frac{5\,\text{Tanh}[a]^6}{2}+\text{Tanh}[a]^8+\right.$$

$$\frac{-\frac{1}{2}+\text{Tanh}[a]^2}{5040}+\frac{1}{720}\,\text{Tanh}[a]\left(\frac{5\,\text{Tanh}[a]}{6}-\text{Tanh}[a]^3\right)+$$

$$\frac{1}{120}\left(\frac{5}{24}-\frac{7\,\text{Tanh}[a]^2}{6}+\text{Tanh}[a]^4\right)+\frac{1}{24}\,\text{Tanh}[a]\left(-\frac{61\,\text{Tanh}[a]}{120}+\frac{3\,\text{Tanh}[a]^3}{2}-\text{Tanh}[a]^5\right)+$$

$$\frac{1}{6}\left(-\frac{61}{720}+\frac{331\,\text{Tanh}[a]^2}{360}-\frac{11\,\text{Tanh}[a]^4}{6}+\text{Tanh}[a]^6\right)+$$

$$\frac{1}{2}\,\text{Tanh}[a]\left(\frac{277\,\text{Tanh}[a]}{1008}-\frac{173\,\text{Tanh}[a]^3}{120}+\frac{13\,\text{Tanh}[a]^5}{6}-\text{Tanh}[a]^7\right)+$$

$$\text{Tanh}[a]\left(-\frac{50\,521\,\text{Tanh}[a]}{362\,880}+\frac{3403\,\text{Tanh}[a]^3}{3024}-\frac{203\,\text{Tanh}[a]^5}{72}+\frac{17\,\text{Tanh}[a]^7}{6}-\text{Tanh}[a]^9\right)\Bigg)+$$

$$(-a+x)^{10}\left(-\frac{505\,219\,\text{Tanh}[a]}{3\,628\,800}+\frac{3403\,\text{Tanh}[a]^3}{3024}-\frac{203\,\text{Tanh}[a]^5}{72}+\frac{17\,\text{Tanh}[a]^7}{6}-\right.$$

$$\text{Tanh}[a]^9+\frac{\text{Tanh}[a]\left(-\frac{1}{2}+\text{Tanh}[a]^2\right)}{40\,320}+\frac{\frac{5\,\text{Tanh}[a]}{6}-\text{Tanh}[a]^3}{5040}+$$

$$\frac{1}{720}\,\text{Tanh}[a]\left(\frac{5}{24}-\frac{7\,\text{Tanh}[a]^2}{6}+\text{Tanh}[a]^4\right)+\frac{1}{120}\left(-\frac{61\,\text{Tanh}[a]}{120}+\frac{3\,\text{Tanh}[a]^3}{2}-\text{Tanh}[a]^5\right)+$$

$$\frac{1}{24}\,\text{Tanh}[a]\left(-\frac{61}{720}+\frac{331\,\text{Tanh}[a]^2}{360}-\frac{11\,\text{Tanh}[a]^4}{6}+\text{Tanh}[a]^6\right)+$$

$$\frac{1}{6}\left(\frac{277\,\text{Tanh}[a]}{1008}-\frac{173\,\text{Tanh}[a]^3}{120}+\frac{13\,\text{Tanh}[a]^5}{6}-\text{Tanh}[a]^7\right)+\frac{1}{2}\,\text{Tanh}[a]$$

$$\left(\frac{277}{8064}-\frac{3071\,\text{Tanh}[a]^2}{5040}+\frac{83\,\text{Tanh}[a]^4}{40}-\frac{5\,\text{Tanh}[a]^6}{2}+\text{Tanh}[a]^8\right)+\text{Tanh}[a]\left(-\frac{50\,521}{3\,628\,800}+\right.$$

$$\frac{94\,723\,\text{Tanh}[a]^2}{259\,200} - \frac{28\,121\,\text{Tanh}[a]^4}{15\,120} + \frac{147\,\text{Tanh}[a]^6}{40} - \frac{19\,\text{Tanh}[a]^8}{6} + \text{Tanh}[a]^{10}\Bigg)\Bigg)$$

In[•]:=
```
Normal[Series[Sech[x], {x, a, 10}]]
```
normal serie secante hiperbólica

Out[•]=

$$\text{Sech}[a] - (-a+x)\,\text{Sech}[a]\,\text{Tanh}[a] + (-a+x)^2\,\text{Sech}[a]\left(-\frac{1}{2} + \text{Tanh}[a]^2\right) +$$
$$(-a+x)^3\,\text{Sech}[a]\left(\frac{5\,\text{Tanh}[a]}{6} - \text{Tanh}[a]^3\right) + (-a+x)^4\,\text{Sech}[a]\left(\frac{5}{24} - \frac{7\,\text{Tanh}[a]^2}{6} + \text{Tanh}[a]^4\right) +$$
$$(-a+x)^5\,\text{Sech}[a]\left(-\frac{61\,\text{Tanh}[a]}{120} + \frac{3\,\text{Tanh}[a]^3}{2} - \text{Tanh}[a]^5\right) +$$
$$(-a+x)^6\,\text{Sech}[a]\left(-\frac{61}{720} + \frac{331\,\text{Tanh}[a]^2}{360} - \frac{11\,\text{Tanh}[a]^4}{6} + \text{Tanh}[a]^6\right) +$$
$$(-a+x)^7\,\text{Sech}[a]\left(\frac{277\,\text{Tanh}[a]}{1008} - \frac{173\,\text{Tanh}[a]^3}{120} + \frac{13\,\text{Tanh}[a]^5}{6} - \text{Tanh}[a]^7\right) +$$
$$(-a+x)^8\,\text{Sech}[a]\left(\frac{277}{8064} - \frac{3071\,\text{Tanh}[a]^2}{5040} + \frac{83\,\text{Tanh}[a]^4}{40} - \frac{5\,\text{Tanh}[a]^6}{2} + \text{Tanh}[a]^8\right) +$$
$$(-a+x)^9\,\text{Sech}[a]\left(-\frac{50\,521\,\text{Tanh}[a]}{362\,880} + \frac{3403\,\text{Tanh}[a]^3}{3024} - \frac{203\,\text{Tanh}[a]^5}{72} + \frac{17\,\text{Tanh}[a]^7}{6} - \text{Tanh}[a]^9\right) +$$
$$(-a+x)^{10}\,\text{Sech}[a]$$
$$\left(-\frac{50\,521}{3\,628\,800} + \frac{94\,723\,\text{Tanh}[a]^2}{259\,200} - \frac{28\,121\,\text{Tanh}[a]^4}{15\,120} + \frac{147\,\text{Tanh}[a]^6}{40} - \frac{19\,\text{Tanh}[a]^8}{6} + \text{Tanh}[a]^{10}\right)$$

In[•]:=
```
Normal[Series[Csch[x], {x, a, 10}]]
```
normal serie cosecante hiperbólica

Out[•]=

$$\begin{aligned}
&\text{Csch}[a] - (-a+x)\,\text{Coth}[a]\,\text{Csch}[a] + (-a+x)^2\left(-\frac{1}{2}+\text{Coth}[a]^2\right)\text{Csch}[a] + \\
&(-a+x)^3\left(\frac{5\,\text{Coth}[a]}{6}-\text{Coth}[a]^3\right)\text{Csch}[a] + (-a+x)^4\left(\frac{5}{24}-\frac{7\,\text{Coth}[a]^2}{6}+\text{Coth}[a]^4\right)\text{Csch}[a] + \\
&(-a+x)^5\left(-\frac{61\,\text{Coth}[a]}{120}+\frac{3\,\text{Coth}[a]^3}{2}-\text{Coth}[a]^5\right)\text{Csch}[a] + \\
&(-a+x)^6\left(-\frac{61}{720}+\frac{331\,\text{Coth}[a]^2}{360}-\frac{11\,\text{Coth}[a]^4}{6}+\text{Coth}[a]^6\right)\text{Csch}[a] + \\
&(-a+x)^7\left(\frac{277\,\text{Coth}[a]}{1008}-\frac{173\,\text{Coth}[a]^3}{120}+\frac{13\,\text{Coth}[a]^5}{6}-\text{Coth}[a]^7\right)\text{Csch}[a] + \\
&(-a+x)^8\left(\frac{277}{8064}-\frac{3071\,\text{Coth}[a]^2}{5040}+\frac{83\,\text{Coth}[a]^4}{40}-\frac{5\,\text{Coth}[a]^6}{2}+\text{Coth}[a]^8\right)\text{Csch}[a] + \\
&(-a+x)^9\left(-\frac{50\,521\,\text{Coth}[a]}{362\,880}+\frac{3403\,\text{Coth}[a]^3}{3024}-\frac{203\,\text{Coth}[a]^5}{72}+\frac{17\,\text{Coth}[a]^7}{6}-\text{Coth}[a]^9\right)\text{Csch}[a] + \\
&(-a+x)^{10}\left(-\frac{50\,521}{3\,628\,800}+\frac{94\,723\,\text{Coth}[a]^2}{259\,200}-\right. \\
&\left.\frac{28\,121\,\text{Coth}[a]^4}{15\,120}+\frac{147\,\text{Coth}[a]^6}{40}-\frac{19\,\text{Coth}[a]^8}{6}+\text{Coth}[a]^{10}\right)\text{Csch}[a]
\end{aligned}$$

In[•]:=
```
Normal[Series[Coth[x], {x, a, 10}]]
```
normal serie cotangente hiperbólica

Out[•]=

$$\begin{aligned}
&\text{Coth}[a] + (-a+x)^3\left(-\frac{1}{3}+\frac{\text{Coth}[a]^2}{2}+\text{Coth}[a]\left(\frac{5\,\text{Coth}[a]}{6}-\text{Coth}[a]^3\right)\right) + \\
&(-a+x)^4\left(\frac{17\,\text{Coth}[a]}{24}-\text{Coth}[a]^3+\right. \\
&\left.\frac{1}{2}\,\text{Coth}[a]\left(-\frac{1}{2}+\text{Coth}[a]^2\right)+\text{Coth}[a]\left(\frac{5}{24}-\frac{7\,\text{Coth}[a]^2}{6}+\text{Coth}[a]^4\right)\right) + \\
&(-a+x)^5\left(\frac{13}{60}-\frac{29\,\text{Coth}[a]^2}{24}+\text{Coth}[a]^4+\frac{1}{6}\left(-\frac{1}{2}+\text{Coth}[a]^2\right)+\right. \\
&\left.\frac{1}{2}\,\text{Coth}[a]\left(\frac{5\,\text{Coth}[a]}{6}-\text{Coth}[a]^3\right)+\text{Coth}[a]\left(-\frac{61\,\text{Coth}[a]}{120}+\frac{3\,\text{Coth}[a]^3}{2}-\text{Coth}[a]^5\right)\right) + \\
&(-a+x)^6\left(-\frac{371\,\text{Coth}[a]}{720}+\frac{3\,\text{Coth}[a]^3}{2}-\text{Coth}[a]^5+\frac{1}{24}\,\text{Coth}[a]\left(-\frac{1}{2}+\text{Coth}[a]^2\right)+\right. \\
&\frac{1}{6}\left(\frac{5\,\text{Coth}[a]}{6}-\text{Coth}[a]^3\right)+\frac{1}{2}\,\text{Coth}[a]\left(\frac{5}{24}-\frac{7\,\text{Coth}[a]^2}{6}+\text{Coth}[a]^4\right)+ \\
&\left.\text{Coth}[a]\left(-\frac{61}{720}+\frac{331\,\text{Coth}[a]^2}{360}-\frac{11\,\text{Coth}[a]^4}{6}+\text{Coth}[a]^6\right)\right) +
\end{aligned}$$

$$(-a+x)^7\left(-\frac{71}{840}+\frac{661\,\text{Coth}[a]^2}{720}-\frac{11\,\text{Coth}[a]^4}{6}+\text{Coth}[a]^6+\frac{1}{120}\left(-\frac{1}{2}+\text{Coth}[a]^2\right)+\frac{1}{24}\,\text{Coth}[a]\left(\frac{5\,\text{Coth}[a]}{6}-\text{Coth}[a]^3\right)+\frac{1}{6}\left(\frac{5}{24}-\frac{7\,\text{Coth}[a]^2}{6}+\text{Coth}[a]^4\right)+\frac{1}{2}\,\text{Coth}[a]\left(-\frac{61\,\text{Coth}[a]}{120}+\frac{3\,\text{Coth}[a]^3}{2}-\text{Coth}[a]^5\right)+\text{Coth}[a]\left(\frac{277\,\text{Coth}[a]}{1008}-\frac{173\,\text{Coth}[a]^3}{120}+\frac{13\,\text{Coth}[a]^5}{6}-\text{Coth}[a]^7\right)\right)+$$

$$(-a+x)^8\left(\frac{3691\,\text{Coth}[a]}{13\,440}-\frac{173\,\text{Coth}[a]^3}{120}+\frac{13\,\text{Coth}[a]^5}{6}-\text{Coth}[a]^7+\frac{1}{720}\,\text{Coth}[a]\left(-\frac{1}{2}+\text{Coth}[a]^2\right)+\frac{1}{120}\left(\frac{5\,\text{Coth}[a]}{6}-\text{Coth}[a]^3\right)+\frac{1}{24}\,\text{Coth}[a]\left(\frac{5}{24}-\frac{7\,\text{Coth}[a]^2}{6}+\text{Coth}[a]^4\right)+\frac{1}{6}\left(-\frac{61\,\text{Coth}[a]}{120}+\frac{3\,\text{Coth}[a]^3}{2}-\text{Coth}[a]^5\right)+\frac{1}{2}\,\text{Coth}[a]\left(-\frac{61}{720}+\frac{331\,\text{Coth}[a]^2}{360}-\frac{11\,\text{Coth}[a]^4}{6}+\text{Coth}[a]^6\right)+\text{Coth}[a]\left(\frac{277}{8064}-\frac{3071\,\text{Coth}[a]^2}{5040}+\frac{83\,\text{Coth}[a]^4}{40}-\frac{5\,\text{Coth}[a]^6}{2}+\text{Coth}[a]^8\right)\right)+$$

$$(-a+x)^9\left(\frac{6233}{181\,440}-\frac{24\,569\,\text{Coth}[a]^2}{40\,320}+\frac{83\,\text{Coth}[a]^4}{40}-\frac{5\,\text{Coth}[a]^6}{2}+\text{Coth}[a]^8+\frac{-\frac{1}{2}+\text{Coth}[a]^2}{5040}+\frac{1}{720}\,\text{Coth}[a]\left(\frac{5\,\text{Coth}[a]}{6}-\text{Coth}[a]^3\right)+\frac{1}{120}\left(\frac{5}{24}-\frac{7\,\text{Coth}[a]^2}{6}+\text{Coth}[a]^4\right)+\frac{1}{24}\,\text{Coth}[a]\left(-\frac{61\,\text{Coth}[a]}{120}+\frac{3\,\text{Coth}[a]^3}{2}-\text{Coth}[a]^5\right)+\frac{1}{6}\left(-\frac{61}{720}+\frac{331\,\text{Coth}[a]^2}{360}-\frac{11\,\text{Coth}[a]^4}{6}+\text{Coth}[a]^6\right)+\frac{1}{2}\,\text{Coth}[a]\left(\frac{277\,\text{Coth}[a]}{1008}-\frac{173\,\text{Coth}[a]^3}{120}+\frac{13\,\text{Coth}[a]^5}{6}-\text{Coth}[a]^7\right)+\text{Coth}[a]\left(-\frac{50\,521\,\text{Coth}[a]}{362\,880}+\frac{3403\,\text{Coth}[a]^3}{3024}-\frac{203\,\text{Coth}[a]^5}{72}+\frac{17\,\text{Coth}[a]^7}{6}-\text{Coth}[a]^9\right)\right)+$$

$$(-a+x)^{10}\left(-\frac{505\,219\,\text{Coth}[a]}{3\,628\,800}+\frac{3403\,\text{Coth}[a]^3}{3024}-\frac{203\,\text{Coth}[a]^5}{72}+\frac{17\,\text{Coth}[a]^7}{6}-\text{Coth}[a]^9+\frac{\text{Coth}[a]\left(-\frac{1}{2}+\text{Coth}[a]^2\right)}{40\,320}+\frac{\frac{5\,\text{Coth}[a]}{6}-\text{Coth}[a]^3}{5040}+\frac{1}{720}\,\text{Coth}[a]\left(\frac{5}{24}-\frac{7\,\text{Coth}[a]^2}{6}+\text{Coth}[a]^4\right)+\frac{1}{120}\left(-\frac{61\,\text{Coth}[a]}{120}+\frac{3\,\text{Coth}[a]^3}{2}-\text{Coth}[a]^5\right)+\frac{1}{24}\,\text{Coth}[a]\left(-\frac{61}{720}+\frac{331\,\text{Coth}[a]^2}{360}-\frac{11\,\text{Coth}[a]^4}{6}+\text{Coth}[a]^6\right)+$$

$$\frac{1}{6}\left(\frac{277\,\text{Coth}[a]}{1008}-\frac{173\,\text{Coth}[a]^3}{120}+\frac{13\,\text{Coth}[a]^5}{6}-\text{Coth}[a]^7\right)+$$
$$\frac{1}{2}\,\text{Coth}[a]\left(\frac{277}{8064}-\frac{3071\,\text{Coth}[a]^2}{5040}+\frac{83\,\text{Coth}[a]^4}{40}-\frac{5\,\text{Coth}[a]^6}{2}+\text{Coth}[a]^8\right)+$$
$$\text{Coth}[a]\left(-\frac{50\,521}{3\,628\,800}+\frac{94\,723\,\text{Coth}[a]^2}{259\,200}-\frac{28\,121\,\text{Coth}[a]^4}{15\,120}+\frac{147\,\text{Coth}[a]^6}{40}-\right.$$
$$\left.\frac{19\,\text{Coth}[a]^8}{6}+\text{Coth}[a]^{10}\right)-(-a+x)\,\text{Csch}[a]^2+(-a+x)^2\,\text{Coth}[a]\,\text{Csch}[a]^2$$

9. Hacer una tabla con los valores de x y cos(x) de 0 a 10.

In[•]:=
```
? Table
```
tabla

Out[•]=

Symbol

Table[*expr*, *n*] generates a list of *n* copies of *expr*.

Table[*expr*, {*i*, i_{max}}] generates a list of the values of *expr* when *i* runs from 1 to i_{max}.

Table[*expr*, {*i*, i_{min}, i_{max}}] starts with $i = i_{min}$.

Table[*expr*, {*i*, i_{min}, i_{max}, *di*}] uses steps *di*.

Table[*expr*, {*i*, {i_1, i_2, …}}] uses the successive values i_1, i_2, ….

Table[*expr*, {*i*, i_{min}, i_{max}}, {*j*, j_{min}, j_{max}}, …] gives a nested list. The list associated with *i* is outermost.

In[•]:=
```
? TableForm
```
forma de tabla

Out[•]=

Symbol

TableForm[*list*] prints with the elements of *list* arranged in an array of rectangular cells.

```
# Table[{x, N[Cos[x]]}, {x, 0, 10}]
# → Genera una tabla con dos columnas:
#    - La primera columna es x desde 0 hasta 10
#    - La segunda columna es el valor numérico de coseno de x

# TableForm[..., TableHeadings -> {None, {...}}]
# → Da formato de tabla para presentación
# → La opción TableHeadings especifica encabezados solo para las columnas (ningún encabezado en filas)
# → Los encabezados están escritos con StyleBox para mostrarlos en negrita

# TableAlignments -> Center
# → Centra horizontalmente el contenido en cada celda

# Style[..., FontSize -> 14, FontFamily -> "Times New Roman"]
# → Aplica un estilo general a toda la tabla:
#    - Tamaño de fuente 14 puntos
#    - Fuente Times New Roman para todo el texto (incluidos encabezados y datos)
```

In[•]:=
```
Style[TableForm[Table[{x, N[Cos[x]]}, {x, 0, 10}],
 TableHeadings → {None, {"x", "Cos(x)"}}, TableAlignments → Center],
 FontSize → 14, FontFamily → "Times New Roman"]
```

Out[•]=

x	Cos(x)
0	1.
1	0.540302
2	−0.416147
3	−0.989992
4	−0.653644
5	0.283662
6	0.96017
7	0.753902
8	−0.1455
9	−0.91113
10	−0.839072

10. Hacer una tabla de los valores de x y log(x) de 0 a 100.

In[•]:=
```
Table[{x, Log[x]}, {x, 0, 100}]
```

Out[•]=
```
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