MatematiCAL anal for economists

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Preface

This textbook is designed to assist economics students studying the basic course of mathematical analysis. It summarizes the entire mathematical analysis course taught to economists in the best undergraduate economics program in Eastern Europe.

The lectures include only the essential material, ensuring that students who have achieved top honors in national economics Olympiads are not overburdened and can maintain their sense of superiority over the rest of the world. After all, they likely mastered all this material in kindergarten (or at the latest, by first grade). The division of topics into lectures corresponds well to the actual pace of the course, which spans an entire semester. Almost all statements in the course are self-evident, and their proofs are left to the reader as straightforward exercises.

Chapter 1

Numbers

1.1 Basic Classes of Numbers

First, let's introduce the definitions of the basic classes of numbers that we will constantly work with throughout the course.

Definition 1 *Numbers 1, 2, 3, . . . are called natural numbers. The notation for the set of all natural numbers is* $\mathbb{N}$.

Definition 2 *A number is called an integer if it is equal to. . . but you don't need this because everything in economics is positive.*

Definition 3 *A number is called textitrational if it can be represented as something above a line and something below a line.*

Definition 4 *A number is called textitirrational if it is not rational.*

Obvious Fact 1 *The sum of all natural numbers equals* $-1/12$.

Kindergarten Example: If Vasya had 2 apples and Petya took 1 apple from him, how many apples does Vasya have left? The answer is obviously $-1/12$, as any advanced mathematician knows.

Chapter 2

Derivative

2.1 Basic derivatives

Definition 5 *The definition of derivative is omitted because it is obvious.*

Everything in this chapter is so obvious that no additional explanations will be provided - we'll immediately proceed to analyze an example from kindergarten. **Let's calculate a simple derivative:**

$$\begin{gathered}\sin(2\cdot x)+\cos(2\cdot x)+\tan(2\cdot x)+\cot(2\cdot x)+\sinh(2\cdot x)\\ +\cosh(2\cdot x)+\ln(2\cdot x)+\tanh(2\cdot x)+\coth(2\cdot x)\end{gathered}\tag{2.1}$$

Should be known from school:

$$(2\cdot x)'=2\tag{2.2}$$

According to the theorem (which number?) from paragraph ??:

$$(\sin(2\cdot x))'=2\cdot\cos(2\cdot x)\tag{2.3}$$

As already shown earlier:

$$(2\cdot x)'=2\tag{2.4}$$

A good, solid task?

$$(\cos(2\cdot x))'=2\cdot -1\cdot\sin(2\cdot x)\tag{2.5}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\sin(2\cdot x)+\cos(2\cdot x))'=2\cdot\cos(2\cdot x)+2\cdot -1\cdot\sin(2\cdot x)\tag{2.6}$$

Let's imagine this household as:

$$(2\cdot x)'=2\tag{2.7}$$

A good, solid task?

$$(\tan(2 \cdot x))' = \frac{2}{(\cos(2 \cdot x)^2)} \tag{2.8}$$

As already shown earlier:

$$(\sin(2 \cdot x) + \cos(2 \cdot x) + \tan(2 \cdot x))' = 2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)} \tag{2.9}$$

It is obvious that:

$$(2 \cdot x)' = 2 \tag{2.10}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\cot(2 \cdot x))' = \frac{2}{(\sin(2 \cdot x)^2)} \cdot -1 \tag{2.11}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$\begin{aligned}&(\sin(2 \cdot x) + \cos(2 \cdot x) + \tan(2 \cdot x) + \cot(2 \cdot x))' \\ &= 2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)} + \frac{2}{(\sin(2 \cdot x)^2)} \cdot -1\end{aligned} \tag{2.12}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(2 \cdot x)' = 2 \tag{2.13}$$

It is common knowledge:

$$(\sinh(2 \cdot x))' = 2 \cdot \cosh(2 \cdot x) \tag{2.14}$$

It is common knowledge:

$$\begin{aligned}&(\sin(2 \cdot x) + \cos(2 \cdot x) + \tan(2 \cdot x) + \cot(2 \cdot x) + \sinh(2 \cdot x))' \\ &= 2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)} + \frac{2}{(\sin(2 \cdot x)^2)} \cdot -1 + 2 \cdot \cosh(2 \cdot x)\end{aligned} \tag{2.15}$$

A good, solid task?

$$(2 \cdot x)' = 2 \tag{2.16}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\cosh(2 \cdot x))' = 2 \cdot \sinh(2 \cdot x) \tag{2.17}$$

A similar one can be proved:

$$
\begin{aligned}
&(\sin(2 \cdot x) + \cos(2 \cdot x) + \tan(2 \cdot x) + \cot(2 \cdot x) + \sinh(2 \cdot x) + \cosh(2 \cdot x))' \\
&\quad = 2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)} \\
&\qquad + \frac{2}{(\sin(2 \cdot x)^2)} \cdot -1 + 2 \cdot \cosh(2 \cdot x) + 2 \cdot \sinh(2 \cdot x)
\end{aligned} \tag{2.18}
$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(2 \cdot x)' = 2 \tag{2.19}$$

It is common knowledge:

$$(\ln(2 \cdot x))' = 2 \cdot \frac{1}{2 \cdot x} \tag{2.20}$$

Let's imagine this household as:

$$
\begin{aligned}
&(\sin(2 \cdot x) + \cos(2 \cdot x) + \tan(2 \cdot x) + \cot(2 \cdot x) + \sinh(2 \cdot x) + \cosh(2 \cdot x) \\
&\quad + \ln(2 \cdot x))' = 2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)} \\
&\qquad + \frac{2}{(\sin(2 \cdot x)^2)} \cdot -1 + 2 \cdot \cosh(2 \cdot x) + 2 \cdot \sinh(2 \cdot x) + 2 \cdot \frac{1}{2 \cdot x}
\end{aligned} \tag{2.21}
$$

Let's imagine this household as:

$$(2 \cdot x)' = 2 \tag{2.22}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\tanh(2 \cdot x))' = \frac{2}{(\cosh(2 \cdot x)^2)} \tag{2.23}$$

A similar one can be proved:

$$
\begin{aligned}
&(\sin(2 \cdot x) + \cos(2 \cdot x) + \tan(2 \cdot x) + \cot(2 \cdot x) + \sinh(2 \cdot x) + \cosh(2 \cdot x) + \ln(2 \cdot x) \\
&\quad + \tanh(2 \cdot x))' = 2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)} + \frac{2}{(\sin(2 \cdot x)^2)} \\
&\qquad \cdot -1 + 2 \cdot \cosh(2 \cdot x) + 2 \cdot \sinh(2 \cdot x) + 2 \cdot \frac{1}{2 \cdot x} + \frac{2}{(\cosh(2 \cdot x)^2)}
\end{aligned} \tag{2.24}
$$

If this is not obvious to you, try attending a lecture for a change:

$$(2 \cdot x)' = 2 \tag{2.25}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\coth(2 \cdot x))' = \frac{2}{(\sinh(2 \cdot x)^2)} \cdot -1 \tag{2.26}$$

It is easy to see:

$$\begin{split}(\sin(2 \cdot x) + \cos(2 \cdot x) + \tan(2 \cdot x) + \cot(2 \cdot x) + \sinh(2 \cdot x) + \cosh(2 \cdot x) \\ + \ln(2 \cdot x) + \tanh(2 \cdot x) + \coth(2 \cdot x))' = 2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \\ \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)} + \frac{2}{(\sin(2 \cdot x)^2)} \cdot -1 + 2 \cdot \cosh(2 \cdot x) \\ + 2 \cdot \sinh(2 \cdot x) + 2 \cdot \frac{1}{2 \cdot x} + \frac{2}{(\cosh(2 \cdot x)^2)} + \frac{2}{(\sinh(2 \cdot x)^2)} \cdot -1\end{split} \tag{2.27}$$

Let's calculate a simple derivative:

$$\begin{split}2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)} + \frac{2}{(\sin(2 \cdot x)^2)} \cdot -1 + 2 \\ \cdot \cosh(2 \cdot x) + 2 \cdot \sinh(2 \cdot x) + 2 \cdot \frac{1}{2 \cdot x} + \frac{2}{(\cosh(2 \cdot x)^2)} + \frac{2}{(\sinh(2 \cdot x)^2)} \cdot -1\end{split} \tag{2.28}$$

It is obvious that:

$$(2 \cdot x)' = 2 \tag{2.29}$$

It is obvious that:

$$(\cos(2 \cdot x))' = 2 \cdot -1 \cdot \sin(2 \cdot x) \tag{2.30}$$

A good, solid task?

$$(2 \cdot \cos(2 \cdot x))' = 2 \cdot 2 \cdot -1 \cdot \sin(2 \cdot x) \tag{2.31}$$

It is easy to see:

$$(2 \cdot x)' = 2 \tag{2.32}$$

According to the theorem (which number?) from paragraph ??:

$$(\sin(2 \cdot x))' = 2 \cdot \cos(2 \cdot x) \tag{2.33}$$

It is obvious that:

$$(-1 \cdot \sin(2 \cdot x))' = -1 \cdot 2 \cdot \cos(2 \cdot x) \tag{2.34}$$

Plus a constant:

$$(2 \cdot -1 \cdot \sin(2 \cdot x))' = 2 \cdot -1 \cdot 2 \cdot \cos(2 \cdot x) \tag{2.35}$$

Let's imagine this household as:

$$(2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x))' = 2 \cdot 2 \cdot -1 \cdot \sin(2 \cdot x) + 2 \cdot -1 \cdot 2 \cdot \cos(2 \cdot x) \quad (2.36)$$

If this is not obvious to you, try attending a lecture for a change:

$$(2 \cdot x)' = 2 \quad (2.37)$$

According to the theorem (which number?) from paragraph ??:

$$(\cos(2 \cdot x))' = 2 \cdot -1 \cdot \sin(2 \cdot x) \quad (2.38)$$

By the obvious theorem:

$$((\cos(2 \cdot x)^2))' = 2 \cdot \cos(2 \cdot x) \cdot 2 \cdot -1 \cdot \sin(2 \cdot x) \quad (2.39)$$

It is common knowledge:

$$(\frac{2}{(\cos(2 \cdot x)^2)})' = \frac{(0 - (2 \cdot 2 \cdot \cos(2 \cdot x) \cdot 2 \cdot -1 \cdot \sin(2 \cdot x)))}{((\cos(2 \cdot x)^2)^2)} \quad (2.40)$$

It is easy to see:

$$\begin{aligned}&(2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)})' \\ &= 2 \cdot 2 \cdot -1 \cdot \sin(2 \cdot x) + 2 \cdot -1 \cdot 2 \cdot \cos(2 \cdot x) + \frac{(0 - (2 \cdot 2 \cdot \cos(2 \cdot x) \cdot 2 \cdot -1 \cdot \sin(2 \cdot x)))}{((\cos(2 \cdot x)^2)^2)}\end{aligned} \quad (2.41)$$

Plus a constant:

$$(2 \cdot x)' = 2 \quad (2.42)$$

If this is not obvious to you, try attending a lecture for a change:

$$(\sin(2 \cdot x))' = 2 \cdot \cos(2 \cdot x) \quad (2.43)$$

By the obvious theorem:

$$((\sin(2 \cdot x)^2))' = 2 \cdot \sin(2 \cdot x) \cdot 2 \cdot \cos(2 \cdot x) \quad (2.44)$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\frac{2}{(\sin(2 \cdot x)^2)})' = \frac{(0 - (2 \cdot 2 \cdot \sin(2 \cdot x) \cdot 2 \cdot \cos(2 \cdot x)))}{((\sin(2 \cdot x)^2)^2)} \quad (2.45)$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\frac{2}{(\sin(2\cdot x)^{2})}\cdot -1)' = \frac{(0-(2\cdot 2\cdot \sin(2\cdot x)\cdot 2\cdot \cos(2\cdot x)))}{((\sin(2\cdot x)^{2})^{2})}\cdot -1 \tag{2.46}$$

It is obvious that:

$$\begin{aligned}&(2\cdot\cos(2\cdot x)+2\cdot -1\cdot\sin(2\cdot x)+\frac{2}{(\cos(2\cdot x)^{2})}+\frac{2}{(\sin(2\cdot x)^{2})}\cdot -1)'\\&=2\cdot 2\cdot -1\cdot\sin(2\cdot x)+2\cdot -1\cdot 2\cdot\cos(2\cdot x)+\frac{(0-(2\cdot 2\cdot\cos(2\cdot x)\cdot 2\cdot -1\cdot\sin(2\cdot x)))}{((\cos(2\cdot x)^{2})^{2})}\\&\quad+\frac{(0-(2\cdot 2\cdot\sin(2\cdot x)\cdot 2\cdot\cos(2\cdot x)))}{((\sin(2\cdot x)^{2})^{2})}\cdot -1\end{aligned} \tag{2.47}$$

If this is not obvious to you, try attending a lecture for a change:

$$(2\cdot x)' = 2 \tag{2.48}$$

It is obvious that:

$$(\cosh(2\cdot x))' = 2\cdot\sinh(2\cdot x) \tag{2.49}$$

A good, solid task?

$$(2\cdot\cosh(2\cdot x))' = 2\cdot 2\cdot\sinh(2\cdot x) \tag{2.50}$$

If this is not obvious to you, try attending a lecture for a change:

$$\begin{aligned}&(2\cdot\cos(2\cdot x)+2\cdot -1\cdot\sin(2\cdot x)+\frac{2}{(\cos(2\cdot x)^{2})}+\frac{2}{(\sin(2\cdot x)^{2})}\cdot -1+2\cdot\cosh(2\cdot x))' = 2\\&\quad\cdot 2\cdot -1\cdot\sin(2\cdot x)+2\cdot -1\cdot 2\cdot\cos(2\cdot x)+\frac{(0-(2\cdot 2\cdot\cos(2\cdot x)\cdot 2\cdot -1\cdot\sin(2\cdot x)))}{((\cos(2\cdot x)^{2})^{2})}\\&\quad+\frac{(0-(2\cdot 2\cdot\sin(2\cdot x)\cdot 2\cdot\cos(2\cdot x)))}{((\sin(2\cdot x)^{2})^{2})}\cdot -1+2\cdot 2\cdot\sinh(2\cdot x)\end{aligned} \tag{2.51}$$

If this is not obvious to you, try attending a lecture for a change:

$$(2\cdot x)' = 2 \tag{2.52}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\sinh(2\cdot x))' = 2\cdot\cosh(2\cdot x) \tag{2.53}$$

Let's imagine this household as:

$$(2\cdot\sinh(2\cdot x))' = 2\cdot 2\cdot\cosh(2\cdot x) \tag{2.54}$$

Plus a constant:

$$(2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)} + \frac{2}{(\sin(2 \cdot x)^2)} \cdot -1 + 2 \cdot \cosh(2 \cdot x) + 2 \cdot \sinh(2 \cdot x))' = 2 \cdot 2 \cdot -1 \cdot \sin(2 \cdot x) + 2 \cdot -1 \cdot 2 \cdot \cos(2 \cdot x) + \frac{(0 - (2 \cdot 2 \cdot \cos(2 \cdot x) \cdot 2 \cdot -1 \cdot \sin(2 \cdot x)))}{((\cos(2 \cdot x)^2)^2)} + \frac{(0 - (2 \cdot 2 \cdot \sin(2 \cdot x) \cdot 2 \cdot \cos(2 \cdot x)))}{((\sin(2 \cdot x)^2)^2)} \cdot -1 + 2 \cdot 2 \cdot \sinh(2 \cdot x) + 2 \cdot 2 \cdot \cosh(2 \cdot x) \tag{2.55}$$

If this is not obvious to you, try attending a lecture for a change:

$$(2 \cdot x)' = 2 \tag{2.56}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\frac{1}{2 \cdot x})' = \frac{-2}{(2 \cdot x^2)} \tag{2.57}$$

A similar one can be proved:

$$(2 \cdot \frac{1}{2 \cdot x})' = 2 \cdot \frac{-2}{(2 \cdot x^2)} \tag{2.58}$$

Plus a constant:

$$(2 \cdot \cos(2 \cdot x) + 2 \cdot -1 \cdot \sin(2 \cdot x) + \frac{2}{(\cos(2 \cdot x)^2)} + \frac{2}{(\sin(2 \cdot x)^2)} \cdot -1 + 2 \cdot \cosh(2 \cdot x) + 2 \cdot \sinh(2 \cdot x) + 2 \cdot \frac{1}{2 \cdot x})' = 2 \cdot 2 \cdot -1 \cdot \sin(2 \cdot x) + 2 \cdot -1 \cdot 2 \cdot \cos(2 \cdot x) + \frac{(0 - (2 \cdot 2 \cdot \cos(2 \cdot x) \cdot 2 \cdot -1 \cdot \sin(2 \cdot x)))}{((\cos(2 \cdot x)^2)^2)} + \frac{(0 - (2 \cdot 2 \cdot \sin(2 \cdot x) \cdot 2 \cdot \cos(2 \cdot x)))}{((\sin(2 \cdot x)^2)^2)} \cdot -1 + 2 \cdot 2 \cdot \sinh(2 \cdot x) + 2 \cdot 2 \cdot \cosh(2 \cdot x) + 2 \cdot \frac{-2}{(2 \cdot x^2)} \tag{2.59}$$

If this is not obvious to you, try attending a lecture for a change:

$$(2 \cdot x)' = 2 \tag{2.60}$$

A good, solid task?

$$(\cosh(2 \cdot x))' = 2 \cdot \sinh(2 \cdot x) \tag{2.61}$$

By the obvious theorem:

$$((\cosh(2\cdot x)^2))' = 2\cdot\cosh(2\cdot x)\cdot 2\cdot\sinh(2\cdot x) \tag{2.62}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\frac{2}{(\cosh(2\cdot x)^2)})' = \frac{(0-(2\cdot 2\cdot\cosh(2\cdot x)\cdot 2\cdot\sinh(2\cdot x)))}{((\cosh(2\cdot x)^2)^2)} \tag{2.63}$$

It is obvious that:

$$\begin{aligned}
&(2\cdot\cos(2\cdot x)+2\cdot -1\cdot\sin(2\cdot x)+\frac{2}{(\cos(2\cdot x)^2)}+\frac{2}{(\sin(2\cdot x)^2)}\cdot -1+2\\
&\cdot\cosh(2\cdot x)+2\cdot\sinh(2\cdot x)+2\cdot\frac{1}{2\cdot x}+\frac{2}{(\cosh(2\cdot x)^2)})' = 2\cdot 2\cdot -1\cdot\sin(2\cdot x)\\
&+2\cdot -1\cdot 2\cdot\cos(2\cdot x)+\frac{(0-(2\cdot 2\cdot\cos(2\cdot x)\cdot 2\cdot -1\cdot\sin(2\cdot x)))}{((\cos(2\cdot x)^2)^2)}\\
&+\frac{(0-(2\cdot 2\cdot\sin(2\cdot x)\cdot 2\cdot\cos(2\cdot x)))}{((\sin(2\cdot x)^2)^2)}\cdot -1+2\cdot 2\cdot\sinh(2\cdot x)+2\cdot 2\\
&\cdot\cosh(2\cdot x)+2\cdot\frac{-2}{(2\cdot x^2)}+\frac{(0-(2\cdot 2\cdot\cosh(2\cdot x)\cdot 2\cdot\sinh(2\cdot x)))}{((\cosh(2\cdot x)^2)^2)}
\end{aligned} \tag{2.64}$$

It is common knowledge:

$$(2\cdot x)' = 2 \tag{2.65}$$

It is common knowledge:

$$(\sinh(2\cdot x))' = 2\cdot\cosh(2\cdot x) \tag{2.66}$$

By the obvious theorem:

$$((\sinh(2\cdot x)^2))' = 2\cdot\sinh(2\cdot x)\cdot 2\cdot\cosh(2\cdot x) \tag{2.67}$$

According to the theorem (which number?) from paragraph ??:

$$(\frac{2}{(\sinh(2\cdot x)^2)})' = \frac{(0-(2\cdot 2\cdot\sinh(2\cdot x)\cdot 2\cdot\cosh(2\cdot x)))}{((\sinh(2\cdot x)^2)^2)} \tag{2.68}$$

If this is not obvious to you, try attending a lecture for a change:

$$(\frac{2}{(\sinh(2\cdot x)^2)}\cdot -1)' = \frac{(0-(2\cdot 2\cdot\sinh(2\cdot x)\cdot 2\cdot\cosh(2\cdot x)))}{((\sinh(2\cdot x)^2)^2)}\cdot -1 \tag{2.69}$$

Should be known from school:

$$
\begin{aligned}
&(2\cdot\cos(2\cdot x)+2\cdot -1\cdot\sin(2\cdot x)+\frac{2}{(\cos(2\cdot x)^{2})}+\frac{2}{(\sin(2\cdot x)^{2})}\cdot -1+2\cdot\cosh(2\cdot x)\\
&\quad+2\cdot\sinh(2\cdot x)+2\cdot\frac{1}{2\cdot x}+\frac{2}{(\cosh(2\cdot x)^{2})}+\frac{2}{(\sinh(2\cdot x)^{2})}\cdot -1)'=2\cdot 2\cdot -1\\
&\qquad\cdot\sin(2\cdot x)+2\cdot -1\cdot 2\cdot\cos(2\cdot x)+\frac{(0-(2\cdot 2\cdot\cos(2\cdot x)\cdot 2\cdot -1\cdot\sin(2\cdot x)))}{((\cos(2\cdot x)^{2})^{2})}\\
&\qquad+\frac{(0-(2\cdot 2\cdot\sin(2\cdot x)\cdot 2\cdot\cos(2\cdot x)))}{((\sin(2\cdot x)^{2})^{2})}\cdot -1+2\cdot 2\cdot\sinh(2\cdot x)+2\\
&\qquad\cdot 2\cdot\cosh(2\cdot x)+2\cdot\frac{-2}{(2\cdot x^{2})}+\frac{(0-(2\cdot 2\cdot\cosh(2\cdot x)\cdot 2\cdot\sinh(2\cdot x)))}{((\cosh(2\cdot x)^{2})^{2})}\\
&\qquad+\frac{(0-(2\cdot 2\cdot\sinh(2\cdot x)\cdot 2\cdot\cosh(2\cdot x)))}{((\sinh(2\cdot x)^{2})^{2})}\cdot -1
\end{aligned}
\tag{2.70}
$$

Chapter 3

Taylor

3.1 Taylor's formula with the remainder term (and why is it needed? Without it, everything is obvious)

Definition 6 *Taylor's formula is obvious, so no additional explanations will be given. Let's start straight with an example.*

At first the derivatives must be calcutated:

Let's calculate a simple derivative:

$$\cos(\sin(x)) + (x^3) \tag{3.1}$$

Plus a constant:

$$(\sin(x))' = \cos(x) \tag{3.2}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.3}$$

By the obvious theorem:

$$((x^3))' = 3 \cdot (x^2) \tag{3.4}$$

It is easy to see:

$$(\cos(\sin(x)) + (x^3))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) + 3 \cdot (x^2) \tag{3.5}$$

Let's calculate a simple derivative:

$$\cos(x) \cdot -1 \cdot \sin(\sin(x)) + 3 \cdot (x^2) \tag{3.6}$$

It is easy to see:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.7}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\sin(x))' = \cos(x) \tag{3.8}$$

A similar one can be proved:

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.9}$$

Let's imagine this household as:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.10}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$\begin{aligned}(\cos(x) \cdot -1 \cdot \sin(\sin(x)))' = {} & -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) \\ & + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))\end{aligned} \tag{3.11}$$

By the obvious theorem:

$$((x^2))' = 2 \cdot x \tag{3.12}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(3 \cdot (x^2))' = 3 \cdot 2 \cdot x \tag{3.13}$$

It is easy to see:

$$\begin{aligned}(\cos(x) \cdot -1 \cdot \sin(\sin(x)) + 3 \cdot (x^2))' = {} & -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\ & \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + 3 \cdot 2 \cdot x\end{aligned} \tag{3.14}$$

Let's calculate a simple derivative:

$$-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + 3 \cdot 2 \cdot x \tag{3.15}$$

A similar one can be proved:

$$(\sin(x))' = \cos(x) \tag{3.16}$$

It is common knowledge:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.17}$$

A good, solid task?

$$(\sin(x))' = \cos(x) \tag{3.18}$$

A good, solid task?

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.19}$$

If this is not obvious to you, try attending a lecture for a change:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.20}$$

Should be known from school:

$$\begin{aligned}(-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\ \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))\end{aligned} \tag{3.21}$$

A similar one can be proved:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.22}$$

Plus a constant:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.23}$$

It is obvious that:

$$(\sin(x))' = \cos(x) \tag{3.24}$$

It is obvious that:

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.25}$$

Plus a constant:

$$(\cos(x) \cdot \cos(\sin(x)))' = -1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.26}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$\begin{aligned}(-1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \\ \cdot -1 \cdot \sin(\sin(x)))\end{aligned} \tag{3.27}$$

A good, solid task?

$$\begin{aligned}(\cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \\ -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \\ \cdot -1 \cdot \sin(\sin(x)))\end{aligned} \tag{3.28}$$

Let's imagine this household as:

$$\begin{aligned}&(-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))'\\ &= -1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x)\\ &\quad \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot\\ &\quad -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))\end{aligned} \tag{3.29}$$

If this is not obvious to you, try attending a lecture for a change:

$$(2 \cdot x)' = 2 \tag{3.30}$$

It is common knowledge:

$$(3 \cdot 2 \cdot x)' = 6 \tag{3.31}$$

According to the theorem (which number?) from paragraph ??:

$$\begin{aligned}&(-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + 3 \cdot 2 \cdot x)'\\ &= -1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x)\\ &\quad \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1\\ &\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + 6\end{aligned} \tag{3.32}$$

Let's calculate a simple derivative:

$$\begin{aligned}&-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x)\\ &\quad \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1\\ &\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + 6\end{aligned} \tag{3.33}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.34}$$

Let's imagine this household as:

$$(-1 \cdot \cos(x))' = -1 \cdot -1 \cdot \sin(x) \tag{3.35}$$

According to the theorem (which number?) from paragraph ??:

$$(\sin(x))' = \cos(x) \tag{3.36}$$

It is easy to see:

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.37}$$

It is common knowledge:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.38}$$

Should be known from school:

$$(-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \\ -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.39}$$

It is common knowledge:

$$(\sin(x))' = \cos(x) \tag{3.40}$$

Plus a constant:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.41}$$

Should be known from school:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.42}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\sin(x))' = \cos(x) \tag{3.43}$$

It is common knowledge:

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.44}$$

Should be known from school:

$$(\cos(x) \cdot \cos(\sin(x)))' = -1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.45}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(-1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \\ \cdot -1 \cdot \sin(\sin(x))) \tag{3.46}$$

If this is not obvious to you, try attending a lecture for a change:

$$(-1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \\ -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) \\ + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \tag{3.47}$$

A similar one can be proved:

$$(-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))' \\ = -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \\ \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \\ \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \tag{3.48}$$

As already shown earlier:

$$(\sin(x))' = \cos(x) \tag{3.49}$$

A good, solid task?

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.50}$$

It is obvious that:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.51}$$

It is easy to see:

$$(\sin(x))' = \cos(x) \tag{3.52}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.53}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\cos(x) \cdot \cos(\sin(x)))' = -1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.54}$$

It is obvious that:

$$\begin{aligned}(-1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \\ \cdot -1 \cdot \sin(\sin(x)))\end{aligned} \tag{3.55}$$

It is easy to see:

$$\begin{aligned}(-1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \\ -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) \\ + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))\end{aligned} \tag{3.56}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.57}$$

A good, solid task?

$$(\sin(x))' = \cos(x) \tag{3.58}$$

Plus a constant:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.59}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\sin(x))' = \cos(x) \tag{3.60}$$

A good, solid task?

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.61}$$

Plus a constant:

$$\begin{aligned}(-1 \cdot \sin(x) \cdot \cos(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \\ \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))\end{aligned} \tag{3.62}$$

It is easy to see:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.63}$$

If this is not obvious to you, try attending a lecture for a change:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.64}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\sin(x))' = \cos(x) \tag{3.65}$$

As already shown earlier:

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.66}$$

Let's imagine this household as:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.67}$$

As already shown earlier:

$$\begin{aligned}(\cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) \\ + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))\end{aligned} \tag{3.68}$$

As already shown earlier:

$$\begin{aligned}(\cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\ \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \\ \cdot \cos(x) \cdot \cos(\sin(x)))\end{aligned} \tag{3.69}$$

Should be known from school:

$$\begin{aligned}&(-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' \\ &= -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \\ &\quad \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\ &\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))\end{aligned} \tag{3.70}$$

It is easy to see:

$$
\begin{aligned}
&(-1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' \\
&= -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\quad \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))
\end{aligned} \tag{3.71}
$$

Understanding this transformation is left to the reader as a simple exercise:

$$
\begin{aligned}
&(\cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' \\
&= -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \\
&\quad + \cos(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \\
&\quad + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))
\end{aligned} \tag{3.72}
$$

It is common knowledge:

$$
\begin{aligned}
&(-1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' = \\
&\quad -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \cdot \\
&\quad -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + \cos(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\quad \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))
\end{aligned} \tag{3.73}
$$

It is easy to see:

$$
\begin{aligned}
&(-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \\
&\quad \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' = \\
&\quad -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \\
&\quad \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \\
&\quad \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \\
&\quad + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \cdot \\
&\quad -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + \cos(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\quad \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))
\end{aligned} \tag{3.74}
$$

It is common knowledge:

$$(-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + 6)' = -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + \cos(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) \tag{3.75}$$

Let's calculate a simple derivative:

$$-1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + \cos(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) \tag{3.76}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\sin(x))' = \cos(x) \tag{3.77}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.78}$$

A good, solid task?

$$(-1 \cdot -1 \cdot \sin(x))' = -1 \cdot -1 \cdot \cos(x) \tag{3.79}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\sin(x))' = \cos(x) \tag{3.80}$$

If this is not obvious to you, try attending a lecture for a change:

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.81}$$

Plus a constant:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.82}$$

Let's imagine this household as:

$$\begin{split}(-1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot -1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\ \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))\end{split} \tag{3.83}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.84}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(-1 \cdot \cos(x))' = -1 \cdot -1 \cdot \sin(x) \tag{3.85}$$

Should be known from school:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.86}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\sin(x))' = \cos(x) \tag{3.87}$$

A good, solid task?

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.88}$$

It is easy to see:

$$(\cos(x) \cdot \cos(\sin(x)))' = -1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.89}$$

Understanding this transformation is left to the reader as a simple exercise:

$$\begin{split}(-1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \\ \cdot -1 \cdot \sin(\sin(x)))\end{split} \tag{3.90}$$

If this is not obvious to you, try attending a lecture for a change:

$$\begin{split}(-1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \\ -1 \cdot \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) \\ + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))\end{split} \tag{3.91}$$

As already shown earlier:

$$\begin{aligned}(-1\cdot -1\cdot \sin(x)\cdot -1\cdot \sin(\sin(x))+-1\cdot \cos(x)\cdot -1\cdot \cos(x)\cdot \cos(\sin(x)))'\\ =-1\cdot -1\cdot \cos(x)\cdot -1\cdot \sin(\sin(x))+-1\cdot -1\cdot \sin(x)\cdot -1\cdot \cos(x)\\ \cdot \cos(\sin(x))+-1\cdot -1\cdot \sin(x)\cdot -1\cdot \cos(x)\cdot \cos(\sin(x))+-1\cdot \cos(x)\\ \cdot -1\cdot (-1\cdot \sin(x)\cdot \cos(\sin(x))+\cos(x)\cdot \cos(x)\cdot -1\cdot \sin(\sin(x)))\end{aligned} \tag{3.92}$$

Should be known from school:

$$(\cos(x))' = -1\cdot \sin(x) \tag{3.93}$$

Let's imagine this household as:

$$(-1\cdot \cos(x))' = -1\cdot -1\cdot \sin(x) \tag{3.94}$$

A good, solid task?

$$(\cos(x))' = -1\cdot \sin(x) \tag{3.95}$$

It is common knowledge:

$$(\sin(x))' = \cos(x) \tag{3.96}$$

Let's imagine this household as:

$$(\cos(\sin(x)))' = \cos(x)\cdot -1\cdot \sin(\sin(x)) \tag{3.97}$$

If this is not obvious to you, try attending a lecture for a change:

$$(\cos(x)\cdot \cos(\sin(x)))' = -1\cdot \sin(x)\cdot \cos(\sin(x))+\cos(x)\cdot \cos(x)\cdot -1\cdot \sin(\sin(x)) \tag{3.98}$$

It is easy to see:

$$\begin{aligned}(-1\cdot \cos(x)\cdot \cos(\sin(x)))' = -1\cdot (-1\cdot \sin(x)\cdot \cos(\sin(x))+\cos(x)\cdot \cos(x)\\ \cdot -1\cdot \sin(\sin(x)))\end{aligned} \tag{3.99}$$

A similar one can be proved:

$$\begin{aligned}(-1\cdot \cos(x)\cdot -1\cdot \cos(x)\cdot \cos(\sin(x)))' = -1\cdot -1\cdot \sin(x)\cdot -1\cdot \cos(x)\cdot \cos(\sin(x))+\\ -1\cdot \cos(x)\cdot -1\cdot (-1\cdot \sin(x)\cdot \cos(\sin(x))\\ +\cos(x)\cdot \cos(x)\cdot -1\cdot \sin(\sin(x)))\end{aligned} \tag{3.100}$$

Plus a constant:

$$(\sin(x))' = \cos(x) \tag{3.101}$$

If this is not obvious to you, try attending a lecture for a change:

$$(-1\cdot \sin(x))' = -1\cdot \cos(x) \tag{3.102}$$

Let's imagine this household as:

$$(\sin(x))' = \cos(x) \tag{3.103}$$

Plus a constant:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.104}$$

A good, solid task?

$$(\sin(x))' = \cos(x) \tag{3.105}$$

It is easy to see:

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.106}$$

It is common knowledge:

$$\begin{aligned}(-1 \cdot \sin(x) \cdot \cos(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \\ \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))\end{aligned} \tag{3.107}$$

It is common knowledge:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.108}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.109}$$

As already shown earlier:

$$(\sin(x))' = \cos(x) \tag{3.110}$$

Let's imagine this household as:

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.111}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.112}$$

Understanding this transformation is left to the reader as a simple exercise:

$$\begin{aligned}(\cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) \\ + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))\end{aligned} \tag{3.113}$$

It is easy to see:

$$\begin{aligned}(\cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\ \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \\ \cdot \cos(x) \cdot \cos(\sin(x)))\end{aligned} \tag{3.114}$$

As already shown earlier:

$$
\begin{aligned}
&(-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' \\
&\quad = -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \\
&\qquad \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))
\end{aligned} \tag{3.115}
$$

It is easy to see:

$$
\begin{aligned}
&(-1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' \\
&\quad = -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\qquad \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))
\end{aligned} \tag{3.116}
$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$
\begin{aligned}
&(-1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' \\
&\quad = -1 \cdot \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + \\
&\quad -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \\
&\qquad + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))
\end{aligned} \tag{3.117}
$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$
\begin{aligned}
&(-1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' = \\
&\qquad -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \cos(x) \cdot \\
&\qquad -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \\
&\qquad \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\qquad \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))
\end{aligned} \tag{3.118}
$$

Should be known from school:

$$(-1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' = -1 \cdot -1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) \tag{3.119}$$

Plus a constant:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.120}$$

A good, solid task?

$$(-1 \cdot \cos(x))' = -1 \cdot -1 \cdot \sin(x) \tag{3.121}$$

Let's imagine this household as:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.122}$$

It is easy to see:

$$(\sin(x))' = \cos(x) \tag{3.123}$$

According to the theorem (which number?) from paragraph ??:

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.124}$$

A good, solid task?

$$(\cos(x) \cdot \cos(\sin(x)))' = -1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.125}$$

Should be known from school:

$$(-1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \tag{3.126}$$

A similar one can be proved:

$$(-1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \tag{3.127}$$

Let's imagine this household as:

$$(\sin(x))' = \cos(x) \tag{3.128}$$

A similar one can be proved:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.129}$$

If this is not obvious to you, try attending a lecture for a change:

$$(\sin(x))' = \cos(x) \tag{3.130}$$

It is obvious that:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.131}$$

Plus a constant:

$$(\sin(x))' = \cos(x) \tag{3.132}$$

It is obvious that:

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.133}$$

It is obvious that:

$$(-1 \cdot \sin(x) \cdot \cos(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.134}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.135}$$

A similar one can be proved:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.136}$$

As already shown earlier:

$$(\sin(x))' = \cos(x) \tag{3.137}$$

Let's imagine this household as:

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.138}$$

It is obvious that:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.139}$$

Let's imagine this household as:

$$\begin{aligned}(\cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) \\ + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))\end{aligned} \tag{3.140}$$

Let's imagine this household as:

$$\begin{aligned}(\cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\ \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \\ \cdot \cos(x) \cdot \cos(\sin(x)))\end{aligned} \tag{3.141}$$

A similar one can be proved:

$$\begin{aligned}&(-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' \\ &= -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \\ &\cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\ &\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))\end{aligned} \tag{3.142}$$

Should be known from school:

$$\begin{aligned}&(-1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' \\ &= -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\ &\cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\ &\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))\end{aligned} \tag{3.143}$$

It is obvious that:

$$\begin{aligned}&(-1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' \\ &= -1 \cdot \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + \\ &-1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \\ &+ -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\ &\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))\end{aligned} \tag{3.144}$$

A similar one can be proved:

$$\begin{aligned}&(-1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \\ &\cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' = \\ &-1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \\ &\cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \cos(x) \cdot \\ &-1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \\ &\cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\ &\cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\ &\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))\end{aligned} \tag{3.145}$$

Plus a constant:

$$(\sin(x))' = \cos(x) \tag{3.146}$$

It is common knowledge:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.147}$$

It is easy to see:

$$(\sin(x))' = \cos(x) \tag{3.148}$$

Plus a constant:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.149}$$

Plus a constant:

$$(\sin(x))' = \cos(x) \tag{3.150}$$

It is common knowledge:

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.151}$$

Plus a constant:

$$\begin{aligned}(-1 \cdot \sin(x) \cdot \cos(\sin(x)))' = {} & -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \\ & \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))\end{aligned} \tag{3.152}$$

Let's imagine this household as:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.153}$$

As already shown earlier:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.154}$$

It is obvious that:

$$(\sin(x))' = \cos(x) \tag{3.155}$$

It is common knowledge:

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.156}$$

As already shown earlier:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.157}$$

It is obvious that:

$$\begin{aligned}(\cos(x) \cdot -1 \cdot \sin(\sin(x)))' = {} & -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) \\ & + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))\end{aligned} \tag{3.158}$$

According to the theorem (which number?) from paragraph ??:

$$(\cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \tag{3.159}$$

Should be known from school:

$$(-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \tag{3.160}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(-1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' = -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) \tag{3.161}$$

Should be known from school:

$$(-1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))' = -1 \cdot \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) \tag{3.162}$$

A good, solid task?

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.163}$$

It is obvious that:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.164}$$

Plus a constant:

$$(-1 \cdot \cos(x))' = -1 \cdot -1 \cdot \sin(x) \tag{3.165}$$

It is common knowledge:

$$(\sin(x))' = \cos(x) \tag{3.166}$$

As already shown earlier:

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.167}$$

Plus a constant:

$$(-1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot -1 \cdot \sin(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.168}$$

As already shown earlier:

$$(\sin(x))' = \cos(x) \tag{3.169}$$

Should be known from school:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.170}$$

It is easy to see:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.171}$$

According to the theorem (which number?) from paragraph ??:

$$(\sin(x))' = \cos(x) \tag{3.172}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.173}$$

Let's imagine this household as:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.174}$$

As already shown earlier:

$$(\cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.175}$$

A good, solid task?

$$(-1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \tag{3.176}$$

It is common knowledge:

$$(-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot -1 \cdot \sin(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \tag{3.177}$$

As already shown earlier:

$$(\sin(x))' = \cos(x) \tag{3.178}$$

It is easy to see:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.179}$$

It is common knowledge:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.180}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\sin(x))' = \cos(x) \tag{3.181}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.182}$$

If this is not obvious to you, try attending a lecture for a change:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.183}$$

A similar one can be proved:

$$\begin{aligned}(\cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) \\ + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))\end{aligned} \tag{3.184}$$

If this is not obvious to you, try attending a lecture for a change:

$$\begin{aligned}(-1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \\ -1 \cdot \sin(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) \\ + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))\end{aligned} \tag{3.185}$$

It is obvious that:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.186}$$

Plus a constant:

$$(\sin(x))' = \cos(x) \tag{3.187}$$

As already shown earlier:

$$(-1 \cdot \sin(x))' = -1 \cdot \cos(x) \tag{3.188}$$

A similar one can be proved:

$$(\sin(x))' = \cos(x) \tag{3.189}$$

Understanding this transformation is left to the reader as a simple exercise:

$$(\sin(\sin(x)))' = \cos(x) \cdot \cos(\sin(x)) \tag{3.190}$$

If this is not obvious to you, try attending a lecture for a change:

$$(-1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot \cos(\sin(x)) \tag{3.191}$$

According to the theorem (which number?) from paragraph ??:

$$\begin{aligned}(-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)))' = -1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\ \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))\end{aligned} \tag{3.192}$$

A similar one can be proved:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.193}$$

If you don't understand this obvious transformation, then you need to go into a program where they don't study mathematical analys:

$$(\cos(x))' = -1 \cdot \sin(x) \tag{3.194}$$

According to the theorem (which number?) from paragraph ??:

$$(\sin(x))' = \cos(x) \tag{3.195}$$

It is common knowledge:

$$(\cos(\sin(x)))' = \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.196}$$

If this is not obvious to you, try attending a lecture for a change:

$$(\cos(x) \cdot \cos(\sin(x)))' = -1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \tag{3.197}$$

Plus a constant:

$$\begin{aligned}(-1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \\ \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))\end{aligned} \tag{3.198}$$

According to the theorem (which number?) from paragraph ??:

$$\begin{aligned}(\cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))' = -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \\ -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \\ \cdot -1 \cdot \sin(\sin(x)))\end{aligned} \tag{3.199}$$

Let's imagine this household as:

$$
\begin{aligned}
&(-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))' \\
&\quad = -1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \\
&\qquad \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \\
&\qquad -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))
\end{aligned}
\tag{3.200}
$$

It is easy to see:

$$
\begin{aligned}
&(\cos(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))' \\
&\quad = -1 \cdot \sin(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \\
&\qquad + \cos(x) \cdot (-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) \\
&\qquad + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))
\end{aligned}
\tag{3.201}
$$

Let's imagine this household as:

$$
\begin{aligned}
&(-1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))' = \\
&\qquad -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\qquad \cdot \sin(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \\
&\qquad + \cos(x) \cdot (-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) \\
&\qquad + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))
\end{aligned}
\tag{3.202}
$$

Should be known from school:

$$
\begin{aligned}
&(-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \\
&\quad \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))))' = \\
&\qquad -1 \cdot -1 \cdot \sin(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \\
&\qquad \cdot \sin(\sin(x)) + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \\
&\qquad + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \cdot \sin(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + \cos(x) \\
&\qquad \cdot (-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \\
&\qquad \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))))
\end{aligned}
\tag{3.203}
$$

A good, solid task?

$$
\begin{aligned}
&(-1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \\
&\cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))))' = -1 \\
&\cdot (-1 \cdot -1 \cdot \sin(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\cdot \sin(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \\
&+ \cos(x) \cdot (-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \\
&\cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \\
&\cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))))
\end{aligned}
\tag{3.204}
$$

A similar one can be proved:

$$
\begin{aligned}
&(\cos(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \\
&\cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))))' = -1 \cdot \sin(x) \\
&\cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) + \cos(x) \cdot \\
&-1 \cdot (-1 \cdot -1 \cdot \sin(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\cdot \sin(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \\
&+ \cos(x) \cdot (-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \\
&\cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \\
&\cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))))
\end{aligned}
\tag{3.205}
$$

Plus a constant:

$$
\begin{aligned}
&(-1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \\
&\quad + \cos(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot \\
&\quad -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))))' = -1 \cdot \cos(x) \cdot \\
&\qquad -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \\
&\qquad \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\qquad \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) + -1 \\
&\qquad \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \\
&\qquad + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) + \cos(x) \cdot \\
&\qquad -1 \cdot (-1 \cdot -1 \cdot \sin(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\qquad \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\qquad \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\qquad \cdot \sin(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \\
&\qquad + \cos(x) \cdot (-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \\
&\qquad \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))))
\end{aligned} \tag{3.206}
$$

Plus a constant:

$$
\begin{aligned}
&(-1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \\
&\cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \cdot -1 \\
&\cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + \cos(x) \cdot -1 \cdot (-1 \cdot \cos(x) \\
&\cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \\
&+ \cos(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))))' = \\
&\quad -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \cos(x) \cdot \\
&\quad -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \\
&\quad \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\qquad \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) + -1 \\
&\quad \cdot \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \\
&\quad + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \\
&\qquad \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) + -1 \\
&\quad \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \\
&\qquad + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) + \cos(x) \cdot \\
&\quad -1 \cdot (-1 \cdot -1 \cdot \sin(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\qquad \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\qquad \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\qquad \cdot \sin(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \\
&\qquad + \cos(x) \cdot (-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \\
&\qquad \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \\
&\qquad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))))
\end{aligned} \tag{3.207}
$$

It is obvious that:

$$
\begin{aligned}
&(-1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \\
&\cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \\
&\cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \\
&+ -1 \cdot \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \\
&\cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \cdot -1 \\
&\cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + \cos(x) \cdot -1 \cdot (-1 \cdot \cos(x) \\
&\cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \\
&+ \cos(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))))' = \\
&\quad -1 \cdot -1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \\
&\quad \cdot \cos(\sin(x)) + -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \\
&\quad \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \\
&\quad + -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \cos(x) \cdot \\
&\quad -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \\
&\quad \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\quad \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) \\
&\quad + -1 \cdot -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \cos(x) \cdot \\
&\quad -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) + -1 \cdot \sin(x) \\
&\quad \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\quad \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) + -1 \\
&\quad \cdot \cos(x) \cdot -1 \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x))) \\
&\quad + -1 \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \\
&\quad \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) + -1 \\
&\quad \cdot \sin(x) \cdot -1 \cdot (-1 \cdot \cos(x) \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) \\
&\quad + -1 \cdot \sin(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)))) + \cos(x) \cdot \\
&\quad -1 \cdot (-1 \cdot -1 \cdot \sin(x) \cdot \cos(\sin(x)) + -1 \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \\
&\quad \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\quad \cdot \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \\
&\quad \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) + -1 \\
&\quad \cdot \sin(x) \cdot (-1 \cdot \sin(x) \cdot -1 \cdot \sin(\sin(x)) + \cos(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x))) \\
&\quad + \cos(x) \cdot (-1 \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \\
&\quad \cdot \cos(\sin(x)) + -1 \cdot \sin(x) \cdot -1 \cdot \cos(x) \cdot \cos(\sin(x)) + \cos(x) \cdot -1 \\
&\quad \cdot (-1 \cdot \sin(x) \cdot \cos(\sin(x)) + \cos(x) \cdot \cos(x) \cdot -1 \cdot \sin(\sin(x)))))
\end{aligned}
\tag{3.208}
$$

Taylor Series:

$$T(\cos(\sin(x)) + (x^3)) = 1 - 0.5 \cdot (x^2) + (x^3) + 0.208333 \cdot (x^4)... \quad (3.209)$$