

CALCULUS

Chapter 5 – Trigonometric, Exponential and Logarithmic Functions

(Material adapted from Chapter 5 of your text)

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MATH@TD

Chapter 5 – Trigonometric, Exponential and Logarithmic Functions

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5.1 The Derivative of $f(x) = e^x$

e is a **transcendental number**, as is the number π . e is named after **Leonard Euler**, who is one of the most brilliant humans to have ever walked the face of the earth.

$$e = 2.71828182845904523536028747135266249775724709369995\dots$$

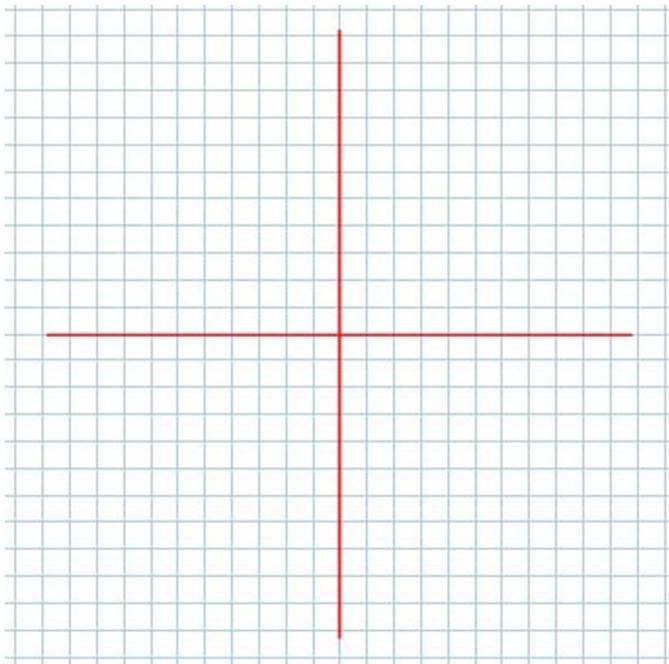
Definition 5.1.1

$$e = \lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n \quad (\text{obviously}\dots)$$

Some properties of the function $f(x) = e^x$

It is an exponential function, with base e .

Picture



The Derivative

Given $f(x) = e^x$, then

$$\frac{df}{dx}(x) = f'(x) =$$

Consider the **composite function** $f(x) = e^{g(x)}$. The by the **Chain Rule**

$$f'(x) =$$

Example 5.1.1

Differentiate:

a) $y = e^{3x^2}$

b) $f(x) = e^{\sqrt[3]{x^2-4}}$

Example 5.1.2

From your text: Pg. 232 #3

Differentiate:

c) $f(x) = \frac{e^{-x^3}}{x}$

b) $y = x \cdot e^{3x}$

d) $g(x) = \sqrt{x} \cdot e^x$

Example 5.1.3

From your text: Pg. 233 #7

Determine the equation of the tangent to the curve $y = x \cdot e^{-x}$ at the point $A(1, e^{-1})$.

Class/Homework for Section 5.1

Pg. 232 – 233 #2 – 4, 6, 9, 11 – 13