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

Contents with suggested problems from the Nelson Textbook (Chapter 5)

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.

$$e = 2.718281828459045235360287471352662497757247093699995...$$

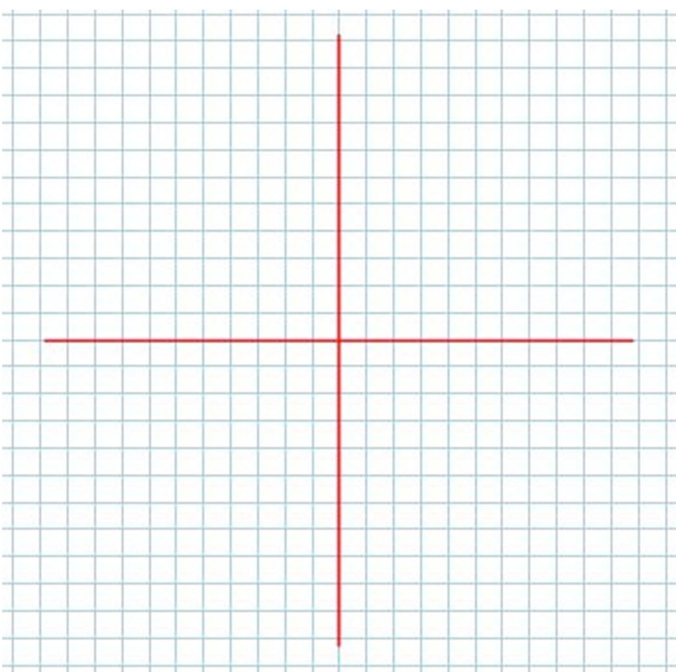
Definition 5.1.1

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

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

$$\frac{\mathrm{d}f}{\mathrm{d}x}(x) = f'(x) =$$

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) $f\left(x\right)=\dfrac{e^{-x^3}}{x}$

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

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

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 $A\left(1, e^{-1}\right)$.

Class/Homework for Section 5.1

Pg. 232 – 233 #2 – 4, 6, 9, 11 – 13