5.2 The Derivative of the General Exponential

In section 5.1 we learned that for the (so called) Natural Exponential Function $f(x)=e^x$ the derivative is given by: $f'(x)=e^x$

We now turn our attention to the General Exponential Function $f(x)=b^x,\ b>0$ and we ask "**what is its derivative?**"

Before answering that question it will be helpful to review a little bit about Exponentials and their inverses: Logarithms.

Given an exponential equation, $y=2^x$ we can invert using a logarithm and isolate for x:

So for $y=e^x$

Finally, recall that $\log_a(a)=$

And so $\log_e(e)=\ln(e)=$

Example 5.2.1

Given $g(x)=2^x$ determine $g'(x)$.

In general, given an exponential function $f(x) = b^x,\ b > 0$, then

$f'(x) =$

Consider the composite function $f(x) = b^{g(x)}$.

$f'(x) =$

Example 5.2.2

From your text: Pg 240 #1. Differentiate:

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

d) $w = 10^{\left(5-6n+n^2\right)}$

Example 5.2.3

From your text: Pg. 240 #2b) Differentiate

$y = x \cdot 3^{x^2}$

Class/Homework for Section 5.2

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