MATH 1 LECTURE 7 MONDAY 09-26-16

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Contents

I. Reminders/Announcements

start 10:10am Bartlett 105

Remarks

- Written HW#1 in Kemeny 1st floor
- Written HW#2 due Wednesday
- WebWork HW06 due today
- WebWork HW06extra due Wednesday
- See m1f15 for old exams
- MIDTERM1 is Thursday and covers material through exp/log...NO TRIG. We have shifted things slightly...
- We have Quiz2 today

II. Quiz2

10:15am

Remarks

Quizzes should be done by 10:25am.

III. More Exponential/Logarithmic Functions

10:25am

Definition

Let $a > 0$ be fixed. We define the exponential function $f(x) = a^x$.
MM: [What is the domain and range of this function?]
MM: [Why do we insist that $a > 0$?]
Now define the logarithmic function $f(x) = \log_a(x)$ by the rule:

$$y = a^x \iff \log_a(y) = x.$$

MM: [What is the domain and range of this function?]
MM: [How is $\log_a(x)$ related to a^x]

Examples

MM: [draw some example graphs]
MM: [There is really just one base $a = e = 2.7182818284590\ldots$]

Examples

Let $x, y \in \mathbb{R}$ and $a > 0$. Then

- $a^{x+y} = a^x a^y$
- $a^{x-y} = \dfrac{a^x}{a^y}$
- $(a^x)^y = a^{xy}$
- $\log_a(xy) = \log_a(x) + \log_a(y)$
- $\log_a\left(\dfrac{x}{y}\right) = \log_a(x) - \log_a(y)$
- $\log_a(x^y) = y \log_a(x)$

Remarks

We are justified in picking a distinguished logarithmic function because every other one can be written as a constant multiple...

$$\log_b(x) = \frac{\log_a(x)}{\log_a(b)}$$

IV. Solving Exponential/Logarithmic Equations

10:35am

Examples

Solve $e^{5x+4} = 7$ for x.

Solution. $x = \dfrac{\log_e(7) - 4}{5}$.

Examples

Solve $(e^{3x})^2 = 5e^{2x}$ for x.

Solution. $x = \dfrac{\log_e(5)}{4}$.

Examples

Solve $\log_3(x^2) = 4$ for x.

Solution. $x = \pm 9$.

10:40am

V. Worksheet from Friday

MM: [We didn't get to this last time. . .]

10:55am

VI. Exam Preparation

Remarks

- WebWork + Written HW due Wed
- m1f15 old exams + review problems posted today
- Topics include:
  - Sequences: bounded, increasing, decreasing
  - even/odd functions
  - average rate of change on an interval
  - compositions: Let $f(x) = \sqrt{x-3}$ and $g(x) = x^2$. Find the domain of $g \circ f$.
  - one-to-one on an interval
  - domain and range: of a function, of an inverse, how they behave under function transformations
    - first question on quiz 2
    - Let f be injective with domain $[-2, 5]$ and range $[-1, 6]$. Find the domain and range of $(-2)f(2x+1)+3$ and $(-1/3)f^{-1}(3x-1)-2$.
  - Lagrange interpolation of 2 points
  - classes of functions: linear, power, poly, rational, etc
  - exp/log
  - solve equations with exp/log

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end
11:15am