MON 11-21-05

GIVEN: $A = 1$

$B = 1$

PROVE: $1 = 2$

$$A = B$$

$$A^2 = AB$$

$$A^2 - B^2 = AB - B^2$$

$$(A+B)\cancel{(A-B)} = B\cancel{(A-B)}$$

$$A + B = B$$

$$1 + 1 = 1$$

$$\therefore 2 = 1$$

THIS IS WRONG

· AP NOTEBOOK PROBLEMS

· ARE FOR YOU TO RELEARN

· IF YOU CAN'T REMEMBER HOW TO DO A PROBLEM:

- NOTES
- BOOK
- OTHER STUDENTS
- G.C.
- TEACHER

*BUT LEARN

(OR RE-LEARN)

*CLEARLY INDICATE PAGE # PROBLEM #

P. 170 22 $y' = \frac{2\ln x}{x}$

P.170 ? 7

$y = \underline{e^2 x} - e^x$

$$y' = e^2 - e^x$$

$y = 7x$

$y' = 7$

Title: Nov 21 - 9:39 AM (3 of 9)

Ex) $y = 2^x$; $y' = ?$

$\cancel{y' = x \cdot 2^{x-1}}$

SAD!

$\ln y = \ln 2^x$

$\ln y = x \cdot \ln 2$

$\ln y = \ln 2 \cdot x$

$$\frac{d(\ln y)}{dx} = \frac{d(\ln 2 \cdot x)}{dx}$$

$$y\left[\frac{1}{y} \cdot y' = \ln 2\right]$$

$y' = \ln 2 \cdot y$

$y' = \ln 2 \cdot 2^x$

CALLED LOGARITHMIC DIFFERENTIATION

$\boxed{\text{GENERALIZE: } y = A^x;\ y' = ? \quad y' = \ln A \cdot A^x}$

GENERALIZE FURTHER:

$$y = A^{\ln u}$$

A IS A CONSTANT

; WHERE u IS A FUNCTION OF x:

$$y' = \ln A \cdot A^{\ln u} \cdot \frac{du}{dx}$$

Ex) $y = 5^{6-3x}$; Find $D_x y$.

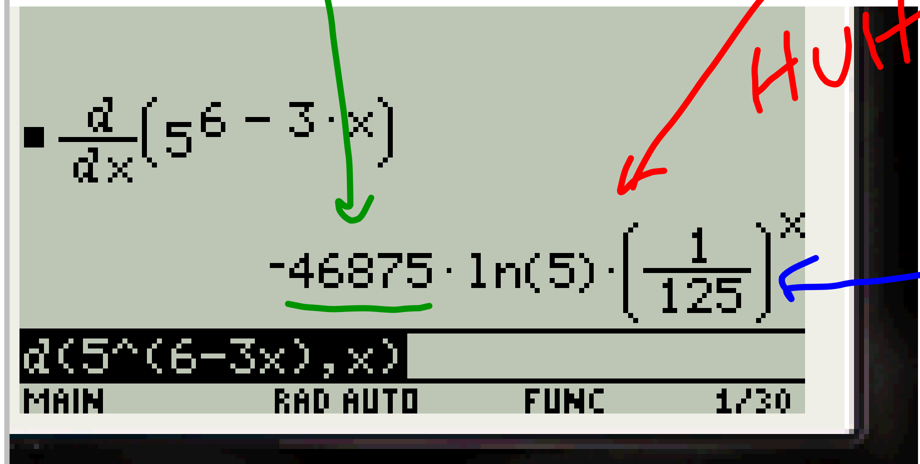
SOLUTION:

$$y' = \ln 5 \cdot 5^{6-3x} \cdot -3$$

$$y' = -3\ln 5 \cdot 5^{6-3x}$$

$-3 \cdot 5^6$

HUH?



ARE THESE EQUIVALENT?

$$5^{-3x} = \left(\frac{1}{125}\right)^x$$

$$y = \log_a x; \quad y' = ?$$

SOLUTION:

$$a^y = x$$

$$\ln a^y = \ln x$$

$$y \cdot \ln a = \ln x$$

$$y' \cdot \ln a = \frac{1}{x}$$

$$\underline{y' = \frac{1}{\ln a} \cdot \frac{1}{x}}$$

GENERALIZE:

$$y = \log_a u(x)$$

$$\boxed{y' = \frac{1}{\ln a} \cdot \frac{1}{u(x)} \cdot \frac{du}{dx}}$$

Ex) p.170 #36

$$y = \frac{1}{\log_2 x}; \frac{dy}{dx} = ?$$

SOLUTION: REWRITE:

$$y = (\log_2 x)^{-1}$$

$$\frac{dy}{dx} = -1 \cdot (\log_2 x)^{-2} \cdot \frac{1}{\ln 2} \cdot \frac{1}{x} \cdot 1$$

$$\frac{dy}{dx} = \frac{-1}{\ln 2 \cdot x \cdot (\log_2 x)^2}$$

WHEW!

O.T.L.

- CORRECT AP PROBLEMS
- CORRECT TODAY'S O.T.L.
- P. 170 14–19 (ALL), 31–41 (ODD)

TEST NEXT TUES: 3.7–3.9

TEST NEXT THUR: CHAP. 3