Algebra 2 7.7

Evaluate expressions involving the natural base and natural logarithms
Solve exponential equations and inequalities using logarithms
Compute continuously compounding interest

common logarithm
e ≈ 2.72
exponential growth
exponential decay
natural logarithm
ln
whiteboards
speed dating (if time)

log
log e
ln
ln e

Quiz 7.5-7.6

b. $\ln(x-8)^4 < 4$

$x - 8 > 0$

$x > 8$

$\sqrt[4]{(x-8)^4} < \sqrt[4]{e^4}$

$x - 8 < e$

$x - 8 < 2.72$

$+8 \quad +8$

$x < 10.72$

$8 < x < 10.72$

My number, their number

My power is lower...

GuidedPractice

Solve each equation or inequality. Round to the nearest ten-thousandth.

5A. $5 \ln 6x = 8$

$\frac{5}{5} \ln 6x = \frac{8}{5}$

$\ln 6x = \frac{8}{5}$

$e^{\frac{8}{5}} = 6x$

$4.95303 = 6x$

$x = .8255$

5B. $\ln (2x - 3)^3 > 6$

$2x - 3 > 0$

$2x > 3$

$x > 1.5$

$e^{\ln (2x-3)^3} > e^6$

$(2x-3)^3 > e^6$

$\sqrt[3]{(2x-3)^3} > \sqrt[3]{e^6}$

$2x - 3 > e^2$

$2x - 3 > 7.3891$

$+3 \quad +3$

$2x > 10.3891$

$x > 5.1945$

my number, their number

my power is higher...

Not quarterly, not monthly, not daily,....

$A = Pe^{rt}$

KeyConcept Continuously Compounded Interest

Calculate continuously compounded interest using the following formula:

$$A = Pe^{rt},$$

where A is the amount in the account after t years, P is the principal amount invested, and r is the annual interest rate.

Stock market, mutual funds, investments,
bacteria, populations...

Real-World Example 6 Solve Base *e* Inequalities

FINANCIAL LITERACY When Angelina was born, her grandparents deposited $3000 into a college savings account paying 4% interest compounded continuously.

a. Assuming there are no deposits or withdrawals from the account, what will the balance be after 10 years?

$A = 3000e^{(0.04 \cdot 10)}$

$= 3000e^{0.4}$

$= 4475.47$

b. How long will it take the balance to reach at least $10,000?

$2e^x - 3 = 1$

$+3 \quad +3$

$\frac{2e^x}{2} = \frac{4}{2}$

$(\ln e)^x = \ln 2$

$x \cdot 1 = 0.6391$

c. If her grandparents want Angelina to have $10,000 after 18 years, how much would they need to invest?

$\ln 3x + \ln 2x = 9$

$\ln 3x \cdot 2x = 9$

$\ln_e 6x^2 = 9$

$e^9 = 6x^2$

$8103 = 6x^2$

$1350.5 = x^2$

$x = \pm 36.75$

36.75

GuidedPractice

6. Use the information in Example 6 to answer the following.

A. If they invested \$8000 at 3.75% interest compounded continuously, how much money would be in the account in 30 years?

B. If they could only deposit \$10,000 in the account above, at what rate would the account need to grow in order for Angelina to have \$30,000 in 18 years?

C. If Angelina's grandparents found an account that paid 5% compounded continuously and wanted her to have \$30,000 after 18 years, how much would they need to deposit?

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