Algebra 2
Review Ch. 7

Test Tues. Ch. 7

Quiz 7.7-7.8

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(11) $\ln(x+2)^2 > 2$

$(x+2)^2 > e^2$

$x+2 > \pm e$

$x+2 > \pm 2.7183$

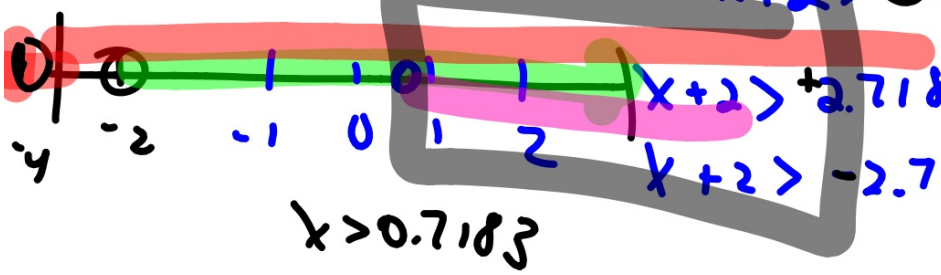
$x+2 > +2.7183 - 2$

$x+2 > -2.7183 - 2$

$x > 0.7183$

$x > -4.7183$

$x+2 > 0$



$x > 0.7183$

9. $\log 6^{n-1} \leq \log 11^n$

$(n-1)(.7782) \leq n(1.0414)$ $\quad 2.9567 \leq n$

$.7782n - .7782 \leq 1.0414n$

$-.7782n \qquad -.7782n$

$-.7782 \leq 0.2632n$

Example 9

Solve $3e^{5x} + 1 = 10$. Round to the nearest ten-thousandth.

$\frac{3e^{5x}}{3} = \frac{9}{3}$ $\ln e^{5x} = \ln 3$

$x = 0.2197$ $\frac{5x \cdot 1}{5} = \frac{1.09861}{5}$

Example 10

A certain culture of bacteria will grow from 250 to 2000 bacteria in 1.5 hours. Find the constant k for the growth formula. Use $y = ae^{kt}$.

$y = 250e^{1.3863t}$

$k = 1.3863$

$2000 = 250e^{1.5k}$

$8 = e^{1.5k}$

$2.07944 = 1.5k$

24. BACTERIA A bacteria population started with 5000 bacteria. After 8 hours there were 28,000 in the sample.

a. Write an exponential function that could be used to model the number of bacteria after x hours if the number of bacteria changes at the same rate.

b. How many bacteria can be expected in the sample after 32 hours?

$y = 5000e^{0.2153t}$

$= 4,910,043$

$28000 = 5000e^{8k}$

$\frac{28000}{5000} = \frac{5000e^{8k}}{5000}$

$\ln 5.6 = \ln e^{8k}$

$1.72277 = 8k$

$0.2153 = k$

7-2 Solving Exponential Equations and Inequalities

Solve each equation or inequality.

18. $16^x = \frac{1}{64}$

19. $3^{4x} = 9^{3x+7}$

7-3 Logarithms and Logarithmic Functions

25. Write $\log_2 \frac{1}{16} = -4$ in exponential form.

26. Write $10^2 = 100$ in logarithmic form.

Evaluate each expression.

27. $\log_4 256$

28. $\log_2 \frac{1}{8}$

7-4 Solving Logarithmic Equations and Inequalities

Solve each equation or inequality.

31. $\log_4 x = \frac{3}{2}$

32. $\log_2 \frac{1}{64} = x$

33. $\log_4 x < 3$

35. $\log_9 (3x - 1) = \log_9 (4x)$

7-1 Graphing Exponential Functions

Graph each function. State the domain and range.

11. $f(x) = 3^x$

12. $f(x) = -5(2)^x$

Example 2

Solve $4^{3x} = 32^{x-1}$ for x.

22. $9^{x-2} > \left(\frac{1}{81}\right)^{x+2}$

Example 6

Use $\log_5 16 \approx 1.7227$ and $\log_5 2 \approx 0.4307$ to approximate $\log_5 32$.

Example 7

Solve $\log_3 3x + \log_3 4 = \log_3 36$.

$\log_3 12x = \log_3 36$

$12x = 36$

$x = 3$

$7 \ln \frac{1}{2} + 5 \cdot \ln 2^5$

$\ln \frac{1}{2}^7 + \ln 2^5$

$\ln \left(\frac{1}{2}^7 \cdot 2^5 \right)$

$\ln 2^{-7} \cdot 2^5$

$\ln 2^{-2}$

$\ln \left(\frac{1}{2} \right)^2$

Example 8

~~Solve $5^{3x} > 7^{x+1}$.~~

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$$\frac{120{,}000}{1+48e^{-0.015t}} = 24e^{0.055t} \qquad t =$$

$$120{,}000 = (1+48e^{-0.015t})(24e^{0.055t})$$

$$120{,}000 = 24e^{0.055t} + 1152e^{-0.015t} \cdot e^{0.055t}$$

$$\ln(120{,}000) = \ln(24e^{0.055t} + 1152e^{0.04t})$$