5.3 day 3

Wednesday, February 22, 2017 9:35 AM

Algebra 2 Trig Honors Name:

5.3 day 3 Evaluating logarithms and finding inverses

Evaluate the following logarithms:

1. $\log_{\frac{8}{3}} \frac{64}{9} =$ 2

2. $\log_{42} \frac{1}{42} =$ -1

3. $\log_{81} 9 =$ $\frac{1}{2}$

4. $\log_{17} 1 =$ 0

5. $\log_{64} \frac{1}{16} =$ $\frac{-2}{3}$

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

$4^{3x} = 4^{-2}$

6. $\log_1 4 =$ UNDefined

7. $\log_{100} 0.001 =$ $-\frac{3}{2}$

$100^x = \frac{1}{1000}$

$10^{2x} = 10^{-3}$

8. $\log_7 \sqrt[3]{49} =$ $\frac{2}{3}$

9. $\log_3 \sqrt[6]{\sqrt[5]{\sqrt{3^5}}} =$ $1/6$

$\log_3 \left(\left(3^{\cancel{5}}\right)^{1/2}\right)^{\cancel{1/5}}$

$= \log_3 3^{1/12} = \frac{1}{12}$

10. Solve for x: $\log_{625} x = \frac{-1}{4}$

$625^{\frac{-1}{4}} = x$

$x = \frac{1}{5}$

11. Solve for x: $\log_x 32 = \frac{5}{2}$

$\left(x^{\frac{5}{2}}\right)^{\frac{2}{5}} = (32)^{\frac{2}{5}}$

$x = 4$

12. Solve for x: $\left(\frac{1}{32}\right)^{-2x+5} = 64^{3x+5}$

$\left(2^{-5}\right)^{-2x+5} = \left(2^6\right)^{3x+5}$

$10x - 25 = 18x + 30$

$-55 = 8x$

$x = -\frac{55}{8}$

13. Find the inverse of $h(x)=7^{x+5}-8$ algebraically.

$x=7^{y+5}-8$

$x+8=7^{y+5}$

$\log_7(x+8)=y+5$

$h^{-1}(x)=\log_7(x+8)-5,$

$x+8>0$ $(-8,\infty)$

$x>-8$

14. Find the inverse of $j(x)=5\cdot 14^{x+1}$ algebraically.

$x=5\cdot 14^{y+1}$

$\frac{x}{5}=14^{y+1}$

$\log_{14}\left(\frac{x}{5}\right)=y+1$

$j^{-1}(x)=\log_{14}\left(\frac{x}{5}\right)-1,$

$x>0$ $(0,\infty)$

15. Find the inverse of $g(x)=\log_2(x-6)+4$ algebraically.

$x=\log_2(y-6)+4$

$x-4=\log_2(y-6)$

$2^{x-4}=y-6$

$g^{-1}(x)=2^{x-4}+6,$

$x>6$

16. Find the inverse of $f(x)=3\log_4(x+6)$ algebraically.

$x=3\log_4(y+6)$

$\frac{x}{3}=\log_4(y+6)$

$4^{\frac{x}{3}}=y+6$

$f^{-1}(x)=4^{\frac{x}{3}}-6$, $x>-6$

17. Let $f(x)=\log_2(x+4)-1$ and $g(x)=2^{x+1}-4$. Show that $f(x)$ and $g(x)$ are inverses by simplifying the composition of $f(g(x))$.

$f(g(x))=\log_2\left[(2^{x+1}-4)+4\right]-1$

$=\log_2 2^{x+1}-1$

$=x+1-1$

$=x$ ✓