Chapter 3.1-3.5 Practice Test

Precalculus | Mr. Cooper

Name ______________________

Date ______________________

Period ______________________

Simplify the expression or solve the equation.

1. $\log \sqrt[3]{10}$

$= \log_{10} 10^{\frac{1}{3}} = \boxed{\frac{1}{3}}$

2. $\ln \sqrt[5]{e}$

$= \ln e^{\frac{1}{5}} = \boxed{\frac{1}{5}}$

3. $\log x = 3.4$

$e^{3.4} = x = \boxed{29.964}$

4. $10^x = 4$

$\log_{10} 10^x = \log_{10} 4$

$x = \log_{10} 4 = \boxed{0.602}$

5. $\ln(3x-2) + \ln(x-1) = 2\ln x$

ln mn

$\ln(3x^2-5x+2) = \ln x^2$

$3x^2-5x+2 = x^2$

$-x^2 \qquad -x^2$

$2x^2-5x+2 = 0$

$(2x-1)(x-2) = 0$

$\cancel{x=\frac{1}{2}}$ extraneous $\quad \boxed{x=2}$

6. $\log_5(x^2-21) = \log_5 x + \log_5 4$

$\log_5(x^2-21) = \log_5 4x$

$x^2-21 = 4x$

$x^2-4x-21 = 0$

$(x-7)(x+3) = 0$

$\boxed{x=7} \quad \cancel{x=-3}$ extraneous

7. $\log_6(x+5) + \log_6(x+12) = \log_6 30$

$\log_6(x^2+17x+60) = \log_6 30$

$x^2+17x+60 = 30$

$-30 \qquad -30$

$x^2+17x+30 = 0$

$(x+15)(x+2) = 0$

$\cancel{x=-15}$ extraneous $\quad \boxed{x=-2}$

8. $\log_3(5x^2+4) - \log_3 8 = 1$

$\log_3 \frac{5x^2+4}{8} = 1$

$8 \cdot 3^1 = \frac{5x^2+4}{8} \cdot 8$

oops

$24 = 5x^2+4$

$-4 \qquad -4$

$\frac{20}{5} = \frac{5x^2}{5}$

$\sqrt{4} = \sqrt{x^2}$

$\boxed{x=\pm 2}$

9. $3^{x-3} = 5$

$\log_3 3^{(x-3)} = \log_3 5$

$x-3 = \log_3 5$

$\boxed{x=4.465}$

10. $5^{2x} = 25^3$

$5^{2x} = (5^2)^3$

$5^{2x} = 5^6$

$\frac{2x}{2} = \frac{6}{2}$

$\boxed{x=3}$

11. $4^{2-3x} = 1$

$\log_4 4^{(2-3x)} = \log_4 1$

$2-3x = \log_4 1$

$2-3x = 0$

$-3x = -2$

$\boxed{x=\frac{2}{3}}$

12. $243^x = 27$

$(3^5)^x = 3^3$

$3^{5x} = 3^3$

$\frac{5x}{5} = \frac{3}{5}$

$\boxed{x=\frac{3}{5}}$

Expand or condense the expression

13. $\log_b \frac{M^2}{N}$ $= \log_b M^2 - \log_b N$

$= \boxed{2\log_b M - \log_b N}$

14. $\log_b M^2N^3$ $= \log_b m^2 + \log_b N^3$

$= \boxed{2\log_b m + 3\log_b N}$

15. $4\log_8 x - 4\log_8 w - 16\log_8 v$

$= \log_8 x^4 - \log_8 w^4 - \log_8 v^{16}$

$= \boxed{\log_8 \frac{x^4 w^4}{v^{16}}}$

16. $\log_6 \left(\frac{xz}{y^4}\right)^3$ $= \log_6 \frac{x^3 z^3}{y^{12}}$

$= \log_6 x^3 + \log_6 z^3 - \log_6 y^{12}$

$= \boxed{3\log_6 x + 3\log_6 z - 12\log_6 y}$

17. $\log_2 3x + 2\log_2 y - \log_2 z$

$= \log_2 3x + \log_2 y^2 - \log_2 z$

$= \boxed{\log_2 \frac{3xy^2}{z}}$

18. $\log_3(wx\sqrt[3]{uv})$

$= \log_3 w + \log_3 x + \log_3 \sqrt[3]{uv}$

$+ \log_3 \sqrt[3]{u} + \log_3 \sqrt[3]{v}$

$+ \log_3 u^{\frac{1}{3}} + \log_3 v^{\frac{1}{3}}$

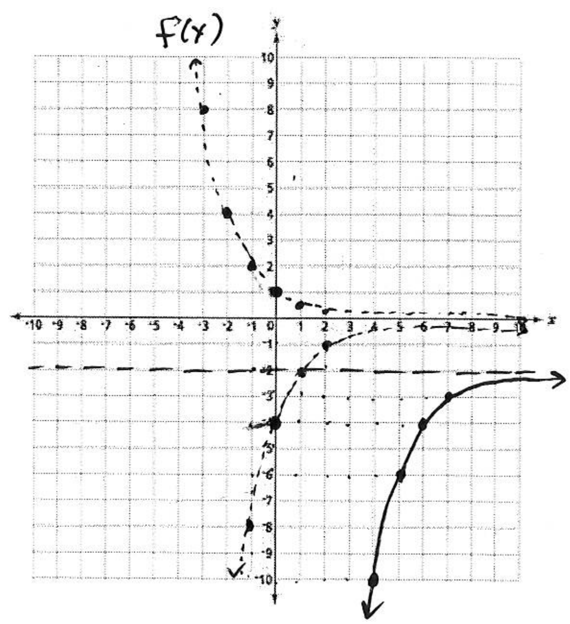
$= \boxed{\log_3 w + \log_3 x + \frac{1}{3}\log_3 u + \frac{1}{3}\log_3 v}$

Describe in detail the transformations off of the parent function $f(x)$ onto $g(x)$. Include whether it is growth or decay. And sketch it!

19. $f(x) = 0.5^x$

$g(x) = -4(0.5)^{x-5} - 2$

- vertical reflection
- vertical stretch by a factor of 4
- shift right 5 units
- shift down 2 units



* If I did my math correctly... lets say each rabbit takes up the area of this piece of paper 8.5 x 11 inches, the earth has a surface area of 196.9 million miles^2, this many rabbits would take up 3.222×10^{11} square miles meaning this many rabbits would cover the earth 1,636 times! If each rabbit was 8 inches tall this would 1090 feet in the air. It'd be a little Stuffy on earth.

20. A strange phenomenon exists in that the number of rabbits in Glade Park doubles every month. A strange man was driving with his 12 rabbits that were his. He was driving too fast teenagers take note, and flipped his car. His 12 rabbits ran into the wild of Glade Park. Write an equation that will describe the number of rabbits in Glade Park as a function of time. How many rabbits were present in 1 year? How about 5? When will there be 10,000 rabbits?

$P(t) = 12(2)^t$ $\quad t = $ months

$P(12) = 12(2)^{12} = \boxed{49{,}152 \text{ rabbits in 1 year}}$

$P(60) = 12(2)^{60} = \boxed{1.384 \times 10^{19} \text{ rabbits in 5 years.}}$ ← Thats a lot of rabbits

$10{,}000 = 12(2)^t$

GRAPH

$y_1 = 10{,}000$

$y_2 = 12(2)^t$

OR

ALGEBRA

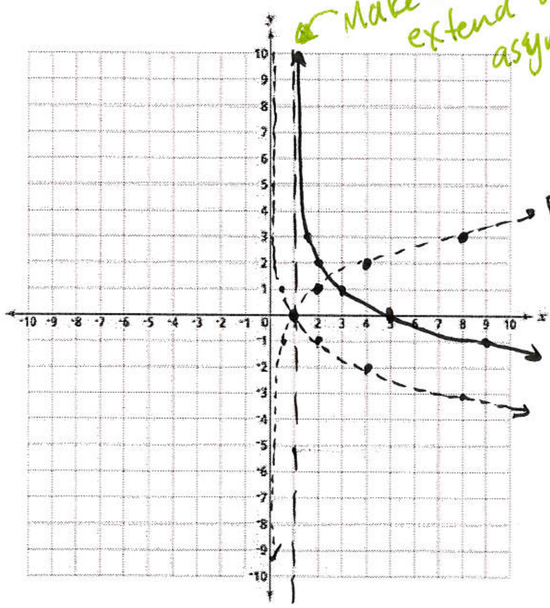
$\frac{10{,}000}{12} = \frac{12(2)^t}{12} \Rightarrow 833.333 = 2^t$

$\log_2 833.333 = t = \boxed{9.703 \text{ months}}$

21. Sketch a graph of each of the following graphs—using transformations to help you. Then list the domain, range, asymptotes and end behavior using limit notation.

$y = -\log_2(x-1) + 2$

Make sure to extend along the asymptote a ways...



$y = \log_2(x+1) + 4$