Intro to logs assignment

1. $\log_2 128 = 7 \Rightarrow 2^7 = 128$

2. $\log_8 64 = 2 \quad 8^2 = 64$

3. $\log_3 \frac{1}{27} = -3 \Rightarrow 3^{-3} = \frac{1}{27}$

4. $4^4 = 256$

$\log_4 256 = 4$

5. $8^3 = 512 \Rightarrow \log_8 512 = 3$

6. $27^{2/3} = 9 \quad \log_{27} 9 = 2/3$

7. $\log_6 36 \Rightarrow 6^x = 36 = 6^2 \quad x = 2$

8. $\log_2 32 \quad 2^x = 32 = 2^5 \quad x = 5$

9. $\log_4 64 = x \Rightarrow 4^x = 64 = 4^3 \Rightarrow x = 3$

10. $\log_3 81 = x \Rightarrow 3^x = 81 \quad 3^x = 3^4 \Rightarrow x = 4$

11. $\log_{100} 10 = x \Rightarrow 100^x = 10$

$10^x = 100 = 10^2 \quad x = 2$

$100^x = 10 = \frac{1}{10^x} = 1/2$

12. $\log_7 1/7 \quad 7^x = 1/7 = 7^{-1}$

$x = -1$

13. $\log_{18} 1 \Rightarrow 18^x = 1 = 18^0 \quad x = 0$

14. $\log_{16} \frac{1}{2} = x$

$16^x = 1/2$.

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

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

$x = -1/4$.

15. $\log 1000 = \log_{10} 1000 = x$

$10^x = 1000 = 10^3 \Rightarrow x = 3$

16 $\log_{16} 8 = x$

$16^x = 8$

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

$4x = 3$

$x = 3/4$.

17. $\log_{243} 27 = x$

$243^x = 27$

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

$5x = 3 \Rightarrow x = 3/5$

18. $\log_3 92 = x \quad = \frac{\log_{10} 92}{\log_{10} 3} = \frac{1.963}{0.4771} = 4.114$

$3^x = 92$

19. $\log_7 35 = \frac{\log_{10} 35}{\log_{10} 7} = \frac{1.54406}{0.84509} = 1.8271$

20 $\log_2 260 = \frac{\log_{10} 260}{\log_{10} 2} = 8.0224$

21) $\log_5 38 = \frac{\log_{10} 38}{\log_{10} 5} = 2.2601$

Putting it all together

19. $2\log 6 - \log 9 = \log 6^2 - \log 9 = \log 36 - \log 9$
$= \log\left(\frac{36}{9}\right) = \log 4$

20. $4\log_4 a + 2\log_4 b = \log_4 a^4 + \log_4 b^2$
$= \log_4 (a^4 \cdot b^2)$

21. $7\log_4 u - 3\log_4 v^2$
$\log_4 u^7 - \log_4 v^6 = \log_4\left(\frac{u^7}{v^6}\right)$

22. $\log_2 15 + \log_2 4 - \log_2 6 = \log_2\left[\frac{15\times 4}{6}\right] = \log_2 (10)$

23. $\log_3 4 + \log_3 y + \frac{1}{2}\log_3 49 = \log_3 4 + \log_3 y + \log_3 7$
$= \log_3 (28y)$

24. $\frac{1}{3}(\log_5 8 + \log_5 27) - \log_5 3$
$\frac{1}{3}(\log_5 8\times 27) - \log_5 3$
$\log_5 216^{\frac{1}{3}} - \log 5^3 = \log_5 6 - \log_5 3 = \log_5 (6/3) = \log_5 2$

25. $3\log_2 4 - \log_2 32 = \log_2 64 - \log_2 32 = \log_2\left(\frac{64}{32}\right) = \log_2 2 = 1$

26. $2\log 6 - \frac{1}{4}\log 16 + \log 3 = \log 36 - \log 2 + \log 3$
$= \log\left(\frac{36\times 3}{2}\right) = \log 54$

27. $\log_6(xy^2) = \log_6 xy + \log_6 z^4 = \log_6 x + \log_6 y + 4\log_6 z$

28. $\log_4\left[\frac{a^9}{b}\right] = \log_4 a^9 - \log b = 9\log_4 a - \log b$

29. $\log_7(q^4r^2)^2 = 2\left[\log 7^{q^4 \cdot r^2}\right]$
$= 2(\log_7 q^4 + \log_7 r^2)$

30. $\log_2\left(\frac{y}{z^5}\right)^2 = 2(\log_2 y - \log_2 z^5)$

31. $\log\sqrt{7x^3} = \log(7x^3)^{\frac{1}{2}} = \frac{1}{2}\log 7x^3$

32. $\log_3 \sqrt[4]{m^5n^2} = \frac{1}{4}(\log_3 m^5 n^2 = \frac{1}{4}(\log_3 m^5 + \log_3 n^2)$