PROBLEM SET 8-4
(Properties of Logarithms)

Write each logarithmic expression as a single logarithm.

1. $\log 7 + \log 2$

2. $\log_2 9 - \log_2 3$

3. $5\log 3 + \log 4$

4. $\log 8 - 2\log 6 + \log 3$

5. $\frac{1}{4}\log_3 2 + \frac{1}{4}\log_3 x$

6. $2\log 3 - \frac{1}{2}\log 4 + \frac{1}{2}\log 9$

7. $\frac{1}{2}(\log_x 4 + \log_x y) - 3\log_x z$

8. $\left(\frac{2\log_b x}{3} + \frac{3\log_b y}{4}\right) - 5\log_b z$

Expand each logarithm.

9. $\log x^3 y^5$

10. $\log_4 5\sqrt{x}$

11. $\log_5 \frac{r}{s}$

12. $\log_3 (2x)^2$

13. $\log \frac{a^2 b^3}{c^4}$

14. $\log_8 8\sqrt{3a^5}$

Use the properties of logarithms to evaluate each expression.

15. $\log_2 4 - \log_2 16$

16. $\log_3 3 + 5\log_3 3$

17. $\log 1 + \log 100$

18. $2\log_8 4 - \frac{1}{3}\log_8 8$

19. $\frac{1}{2}\log_5 1 - 2\log_5 5$

20. $\log_9 \frac{1}{3} + 3\log_9 3$

Assume that log 4 = .6021, log 5 = .6990 and log 6 = .7782. Use the properties of logarithms to evaluate each expression. Do not use your calculator to evaluate.

21. $\log 24$

22. $\log 30$

23. $\log \frac{1}{4}$

24. $\log \sqrt{5}$