The Weekly Rigor

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39 Problems in Expanding and Contracting Logarithms

(Part 1)

For problems 1-28, expand each logarithm completely, using the various logarithm rules.

1. $\ln(6 \cdot 11)$

2. $\ln(5 \cdot 3)$

3. $\ln\left(\frac{6}{11}\right)^5$

4. $\ln(6 \cdot 2^3)$

5. $\ln\left(\frac{2^4}{5}\right)$

6. $\ln\left(\frac{6}{5}\right)^6$

7. $\ln\left(\frac{x}{y^6}\right)$

8. $\ln(a \cdot b)^2$

9. $\ln\left(\frac{u^4}{v}\right)$

10. $\ln\left(\frac{x}{y^5}\right)$

11. $\ln\left(\sqrt[3]{x \cdot y \cdot z}\right)$

12. $\ln(x \cdot y \cdot z^2)$

13. $\ln\left(\frac{x^4}{y^2}\right)$

14. $\ln\left(\frac{2^3}{5^2}\right)$

15. $\ln\left(z^3 \sqrt{x \cdot y}\right)$

16. $\ln\left(\frac{a^3}{b^3}\right)$

17. $\ln(uv^3)^2$

18. $\ln(12 \cdot 7^2)^4$

19. $\ln(2x^{2x})$

20. $\ln\left(4x^{x^4}\right)$

21. $\ln(3x^4+4)^3\sqrt{5x^3+1}$

22. $\ln\sqrt[3]{4x^2-1}(14x^5+7)^4$

23. $\ln\frac{(x^2+3)^4}{(5x^5-2)^5\cdot(3x^2-5)^2}$

24. $\ln\frac{\sin^2(x)\cos(x)}{x^4\tan^3(4x)}$

25. $\ln\frac{\sqrt{\theta}}{1+\sqrt{\theta}}$

26. $\ln\left(\frac{\sqrt[x]{a}+\sqrt[x]{b}}{2}\right)^x$

27. $\ln\left(x^{\ln(x)}\right)^x$

28. $\ln\left(x^{\sin(x)}\right)$

For problems 29-39, contract each expression completely, using the various logarithm rules.

29. $\ln(3)-\ln(8)$

30. $\frac{\ln(6)}{3}$

31. $4\ln(3)-4\ln(8)$

32. $\ln(2)+\ln(11)+\ln(7)$

33. $\ln(7)-2\ln(12)$

34. $\frac{2\ln(7)}{3}$

35. $6\ln(u)+6\ln(v)$

36. $\ln(x)-4\ln(y)$

37. $\ln(u)-6\ln(v)$

38. $20\ln(u)+5\ln(v)$

39. $4\ln(u)-20\ln(v)$