Properties of Logarithms

Expand the following logarithms (to a sum of multiples of single logarithms).

1. $\log\left(x(x-3)^7\right)$

2. $\log\left((x+2)^5(x-3)^7\right)$

3. $\log\left(\dfrac{(x+9)}{(x-3)^7}\right)$

4. $\log\left(\dfrac{(x-2)^9(x+7)^2}{(x+3)^4(x-5)^8}\right)$

5. $\log\left(\dfrac{(x+3)^9(x-5)^3}{(x-3)^{10}(x+5)^7}\right)$

6. $\log\left(\dfrac{(x+3)^9(x-5)^3}{(x-3)^{10}\sqrt{x+5}}\right)$

Contract the following logarithmic expressions (to single logarithms).

7. $\log(x + 3) + \log(x - 5)$

8. $3\log(x + 7) + 9\log(x - 5)$

9. $3\log(x + 6) - 6\log(x - 4)$

10. $3\log(x + 5) - 9\log(x - 2) - \log(x)$

11. $9\log(x + 7) - 3\log(x - 5) + 6\log(x - 8)$

12. $2\log(x + 7) - 9\log(x - 5) + 6\log(x - 8) + 7\log(x)$

13. $2\log(x + 7) - 9\log(x - 5) - 6\log(x - 8) + 7\log(x)$

14. $2\log(x + 7) - 9\log(x - 5) - 6\log(x - 8) - 7\log(x)$

15. $2\log(x + 7) - 9\log(x - 5) - \dfrac{1}{2}\log(x - 8) - 7\log(x)$

Properties of Logarithms

Answers:

1. $\log(x) + 7\log(x - 3)$

2. $5\log(x + 2) + 7\log(x - 3)$

3. $\log(x + 9) - 7\log(x - 3)$

4. $9\log(x - 2) + 2\log(x + 7) - 4\log(x + 3) - 8\log(x - 5)$

5. $9\log(x + 3) + 3\log(x - 5) - 10\log(x - 3) - 7\log(x + 5)$

6. $9\log(x + 3) + 3\log(x - 5) - 10\log(x - 3) - \frac{1}{2}\log(x + 5)$

7. $\log(x + 3) + \log(x - 5)$ $\log((x+3)(x-5))$

8. $3\log(x + 7) + 9\log(x - 5)$ $\log\left((x+7)^3(x-5)^9\right)$

9. $3\log(x + 6) - 6\log(x - 4)$ $\log\left(\frac{(x+6)^3}{(x-4)^6}\right)$

10. $3\log(x + 5) - 9\log(x - 2) - \log(x)$ $\log\left(\frac{(x+5)^3}{(x-2)^9 x}\right)$

11. $9\log(x + 7) - 3\log(x - 5) + 6\log(x - 8)$ $\log\left(\frac{(x+7)^9(x-8)^6}{(x-5)^3}\right)$

12. $2\log(x + 7) - 9\log(x - 5) + 6\log(x - 8) + 7\log(x)$ $\log\left(\frac{(x+7)^2(x-8)^6 x^7}{(x-5)^9}\right)$

13. $2\log(x + 7) - 9\log(x - 5) - 6\log(x - 8) + 7\log(x)$ $\log\left(\frac{(x+7)^2 x^7}{(x-5)^9(x-8)^6}\right)$

14. $2\log(x + 7) - 9\log(x - 5) - 6\log(x - 8) - 7\log(x)$ $\log\left(\frac{(x+7)^2}{(x-5)^9(x-8)^6 x^7}\right)$

15. $2\log(x + 7) - 9\log(x - 5) - \frac{1}{2}\log(x - 8) - 7\log(x)$ $\log\left(\frac{(x+7)^2}{(x-5)^9(x-8)^{1/2} x^7}\right)$