**3-3 Practice - *Properties of Logarithms***

**Expand each expression.**

 **5.** ln $\frac{x + 1}{\sqrt[4]{x - 5}}$ **6.** ln $\frac{x^{2}}{\sqrt{3x + 2}}$

 **7.** $log\_{2}$ [$(2x)^{3}$(*x* + 1)] **8.** $log\_{8}$ [$(4x + 2)^{3}$ (*x* − 4)]

 **9.** $log\_{13}$ $\frac{3x^{4}}{\sqrt[3]{7x - 3}}$ **10.** $log\_{2}$ $\frac{(x + 1)^{3}}{\sqrt[3]{x + 5}}$

**Condense each expression.**

**11.** $\frac{1}{2}$ ln (3*x* – 5*y*) – ln (4*x* + *y*) **12.** 3 $log\_{2}$ (5*x* + 6) − $\frac{1}{2}$ $log\_{2}$ (*x* − 4)

**13.** 2 – $log\_{7}$ 6 – 2 $log\_{7}$ *x* **14.** $log\_{3}$ 8 + $log\_{3}$ *x* – 2 $log\_{3}$ (*x* + 4)

**15.** log *y* + log 3 − $\frac{1}{3}$ log(*x*) + 2 log *z* **16.** $log\_{3}$ *y* + $log\_{3}$ *x* – $\frac{1}{2}$ $log\_{3}$ *x* + 3 $log\_{3}$ *z*

**Evaluate each logarithm.**

**17.** $log\_{\frac{1}{2}}$ $\frac{1}{5}$ **18.** $log\_{100}$ 200 **19.** $log\_{0.01}$ 4

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