***Solution Section* 3.4 – Properties of Logarithms**

***Exercise***

Express the following in terms of sums and differences of logarithms: 

***Solution***



***Exercise***

Express the following in terms of sums and differences of logarithms: 

***Solution***





***Exercise***

Express the following in terms of sums and differences of logarithms: 

***Solution***





***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***





***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***



***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***





***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***

 ***Quotient Rule***

 ***Product Rule***

 ***Power Rule***

***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***









***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***







***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***





***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***









***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***

*Power Rule*

=  *Quotient Rule*

 *Product Rule*

 *Power Rule*





***Exercise***

Use the properties of logarithms to rewrite: 

***Solution***

 *Power Rule*

 *Quotient Rule*

 *Product Rule*

 *Power Rule*





***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***



 *Power Rule*

 *Quotient Rule*

 *Product Rule*

 *Power Rule*



***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***

 ***Convert the radical to power***

 ***Power Rule***

 ***Quotient Rule***

 ***Product Rule***

 ***Power Rule***





***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***







***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***



=  − 

=  −  − 

=  − 2 − 3



***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***

 ***Quotient rule***

 ***Product rule***

 ***Distribute minus***  ***Power rule***

***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***

 ***Quotient rule***

 ***Product rule***

 ***Distribute minus***

 ***Power rule***

***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***



 ***Power rule***

 ***Quotient rule***

 ***Product rule***



 ***Power rule***



***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***

 ***Product rule***



 ***Quotient rule***

 ***Power rule***

***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***













***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***







***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***





***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***





***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***







***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***











***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***





***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***













***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***









***Exercise***

Express the following in terms of sums and differences of logarithms 

***Solution***











***Exercise***

Write the expression as a single logarithm and simplify if necessary: 

***Solution***





***Exercise***

Write the expression as a single logarithm and simplify if necessary: 

***Solution***







***Exercise***

Write the expression as a single logarithm and simplify if necessary: 

***Solution***





***Exercise***

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***Solution***







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Write the expression as a single logarithm and simplify if necessary:



***Solution***









***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***



















***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***













***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***













***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***







***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***









***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***













***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***













***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***















***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***







***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***









= 



***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***









***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***







***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***







***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***







***Exercise***

Write the expression as a single logarithm and simplify if necessary:



***Solution***







***Exercise***

Assume that. Find each logarithm , 

***Solution***

1. 







1. 







***Exercise***

Given that: ,, and  find each of the following:

|  |  |  |
| --- | --- | --- |
|  |  |  |

***Solution***

1. 





1. 







1. 









1. 





1.  Can’t be found from the given information
2. 









