***Section* 3.5 – Exponential and logarithmic Equations**

**Exponential Equations**

 for any b > 0, ≠ 1

***Example***

Solve 

***Solution***









***Example***

Solve 

***Solution***













**Using *Natural Logarithms***

1. Isolate the exponential expression
2. Take the natural logarithm on both sides of the equation
3. Simplify using one of the following properties: 
4. Solve for the variable

***Example***

Solve: 

***Solution***

 ***Isolate the exponential expression***

 ***Divide by 7 both sides***

 ***Natural logarithm on both sides***

 ***Use inverse Property***





***Example***

Solve: 

***Solution***

 ***Natural logarithm on both sides***

 ***Power Rule***









**Logarithmic Equations**

1. Express the equation in the form 
2. Use the definition of a logarithm to rewrite the equation in exponential form:



1. Solve for the variable
2. Check proposed solution in the original equation. Include only the set for M > 0

***Example***

Solve: 

***Solution***

 ***Product Rule***

***Convert to exponential form***



 ***Solve for x***

*x* = −2, 5

***Check***: *x* = −2 ⇒ 

*x* = 5 ⇒ 

∴ ***Solution***: 

***Example***

Solve: 

***Solution***

 ***Product Rule***

 ***Convert to exponential form***



 ***Solve for x***

 

***∴ Solution***: 

**Property of Logarithmic Equality**

For any *M* > 0, *N* > 0, *b* > 0, ≠ 1

 **⇒** 

***Example***

Solve: 

***Solution***

 ***Quotient Rule***











***Check*:** *x* = 4 ⇒ 

*x* = 5 ⇒ 

∴ ***Solution***: 

***Example***

Solve: 

***Solution***

 ***Quotient Rule***

 ***Multiply by x* + 2**





 ***Solve for x***



***Check:***  *Or* ***Domain***



∴ ***Solution***: 

***Exercises Section* 3.5 – Exponential and logarithmic Equations**

(**1** − **105**) Solve the equations

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

1. 
2. 
3. 
4. 
5. 
6. Solve for *t* using logarithms with base *a*: 
7. Solve for *t* using logarithms with base *a*: 