***Solution Section* 1.6 – Exact Differential Equations**

***Exercise***

Solve the differential equation 

***Solution***















***Exercise***

Solve the differential equation 

***Solution***















***Exercise***

Solve the differential equation 

***Solution***















***Exercise***

Solve the differential equation 

***Solution***





















***Exercise***

Solve the differential equation 

***Solution***













***Exercise***

Solve the differential equation 

***Solution***











***Exercise***

Find the general solution 

***Solution***

Let 























***Exercise***

Find the general solution 

***Solution***

Let 

 ***Divide both side by*** 













***Exercise***

Find the general solution 

***Solution***

Let 



 ***Divide both side by*** 















***Exercise***

Find the general solution 

***Solution***

Let 

 ***Divide both side by*** 















***Exercise***

Find the general solution 

***Solution***

Let 

 ***Divide both side by*** 















***Exercise***

Find the general solution 

***Solution***

Let 

 ***Divide both side by*** 















***Exercise***

Find the general solution 

***Solution***

Let 

 ***Divide both side by*** 



















***Exercise***

Find the general solution 

***Solution***

Let 

 ***Divide both side by*** 





























***Exercise***

Find the general solution 

***Solution***

Let 



 ***Divide both side by*** 

















***Exercise***

Find the general solution 

***Solution***

Let 



 ***Divide both side by*** 















***Exercise***

Find the general solution 

***Solution***



Let 



 ***Multiply both sides by*** 













***Exercise***

Find the general solution 

***Solution***

 ***Divide by*** 

Let 



 ***Multiply both sides by*** 

















***Exercise***

Find the general solution 

***Solution***



 ***Divide by*** 

Let 



 ***Multiply both sides by*** 















***Exercise***

Find the general solution 

***Solution***



 ***Divide both sides by*** 

Let 



 ***Multiply both sides by*** 

















***Exercise***

Find the general solution 

***Solution***

 ***Divide both sides by*** 

Let 



 ***Multiply both sides by*** 











***Exercise***

Find the general solution 

***Solution***

 ***Divide both sides by*** 



Let 

 ***Multiply both sides by*** 

















***Exercise***

Find the general solution 

***Solution***

Let 



















***Exercise***

Find the general solution 

***Solution***

Let 







Let 



 ***Multiply both sides by*** 



















***Exercise***

Find the general solution 

***Solution***

Let 





Let 





















***Exercise***

Find the general solution 

***Solution***









Let 



























***Exercise***

Find the general solution 

***Solution***



Let 



















***Exercise***

Solve the differential equation 

***Solution***





















***Exercise***

Solve the differential equation 

***Solution***



















***Exercise***

Solve the differential equation 

***Solution***















***Exercise***

Solve the differential equation 

***Solution***

















***Exercise***

Solve the differential equation 

***Solution***

Multiply both side by  since  



















***Exercise***

Find the general solution 

***Solution***

















***Exercise***

Find the general solution 

***Solution***



















***Exercise***

Find the general solution 

***Solution***



















***Exercise***

Find the general solution 

***Solution***



















***Exercise***

Find the general solution 

***Solution***





















***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

***Solution***













***Exercise***

Find the general solution 

***Solution***















***Exercise***

Find the general solution 

***Solution***















***Exercise***

Find the general solution 

***Solution***



















***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

***Solution***















***Exercise***

Find the general solution 

***Solution***













***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

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***Exercise***

Find the general solution 

***Solution***













***Exercise***

Find the general solution 

***Solution***













***Exercise***

Find the general solution 

***Solution***













***Exercise***

Find the general solution 

***Solution***













***Exercise***

Find the general solution 

***Solution***



















***Exercise***

The given equation is not exact. However, if you multiply by the given integrating factor, then it becomes exact. Then solve the equation



***Solution***













***Exercise***

The given equation is not exact. However, if you multiply by the given integrating factor, then it becomes exact. Then solve the equation



***Solution***



















***Exercise***

The given equation is not exact. However, if you multiply by the given integrating factor, then it becomes exact. Then solve the equation



***Solution***



















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***Solution***





















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***Solution***

















***Exercise***

The given equation is not exact. However, if you multiply by the given integrating factor, then it becomes exact. Then solve the equation



***Solution***

























***Exercise***

The given equation is not exact. However, if you multiply by the given integrating factor, then it becomes exact. Then solve the equation 

***Solution***





















***Exercise***

Find the general solution of the homogenous equation 

***Solution***

























***Exercise***

Find the general solution of the homogenous equation 

***Solution***























***Exercise***

Find the general solution of the homogenous equation 

***Solution***























***Exercise***

Find an integrating factor and solve the given equation 

***Solution***

















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











***Exercise***

Find an integrating factor and solve the given equation 

***Solution***

 *Multiply by* ***y*** *both sides*

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











***Exercise***

Find an integrating factor and solve the given equation 

***Solution***



 *Multiply by* ***siny*** *both sides*













***Exercise***

Find an integrating factor and solve the given equation 

***Solution***















***Exercise***

Find an integrating factor and solve the given equation 

***Solution***



















***Exercise***

Find an integrating factor and solve the given equation 

***Solution***





















***Exercise***

Find an integrating factor and solve the given equation 

***Solution***





























***Exercise***

Find an integrating factor and solve the given equation 

***Solution***





















***Exercise***

Find an integrating factor and solve the given equation 

***Solution***























***Exercise***

Find an integrating factor and solve the given equation 

***Solution***



















***Exercise***

Solve the given initial-value problem 

***Solution***

























***Exercise***

Solve the given initial-value problem 

***Solution***



















***Exercise***

Solve the given initial-value problem 

***Solution***





















***Exercise***

Solve the given initial-value problem 

***Solution***























***Exercise***

Solve the given initial-value problem 

***Solution***























***Exercise***

Solve the given initial-value problem 

***Solution***















***Exercise***

Solve the given initial-value problem 

***Solution***



















***Exercise***

Solve the given initial-value problem 

***Solution***



















***Exercise***

Solve the given initial-value problem 

***Solution***





















***Exercise***

Solve the given initial-value problem 

***Solution***

Let 





















***Exercise***

Solve the given initial-value problem 

***Solution***

















Since 

***Exercise***

Solve the given initial-value problem 

***Solution***



















***Exercise***

Solve the given initial-value problem 

***Solution***





















***Exercise***

Solve the given initial-value problem 

***Solution***























***Exercise***

Solve the given initial-value problem 

***Solution***

















***Exercise***

Solve the given initial-value problem 

***Solution***



















***Exercise***

Solve the given initial-value problem 

***Solution***

Let 



























***Exercise***

Solve the given initial-value problem 

***Solution***



Let 





















***Exercise***

Solve the given initial-value problem 

***Solution***



Let 

























***Exercise***

Solve the given initial-value problem 

***Solution***





Let 

























***Exercise***

Solve the given initial-value problem 

***Solution***





Let 

































Since the given initial 



***Exercise***

Solve the given initial-value problem 

***Solution***



Let 























***Exercise***

Solve the given initial-value problem 

***Solution***

Let 









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



















***Exercise***

Solve the given initial-value problem 

***Solution***

















***Exercise***

Solve the given initial-value problem 

***Solution***





















***Exercise***

Solve the given initial-value problem 

***Solution***















***Exercise***

Solve the given initial-value problem 

***Solution***















***Exercise***

Solve the given initial-value problem 

***Solution***



















***Exercise***

Solve the given initial-value problem 

***Solution***

















***Exercise***

Solve the given initial-value problem 

***Solution***





















***Exercise***

Solve the given initial-value problem 

***Solution***



















***Exercise***

Solve the given initial-value problem 

***Solution***



















***Exercise***

Solve the given initial-value problem 

***Solution***



















***Exercise***

Find an integrating factor of the form  and solve the equation



***Solution***







For the equation to be exact, then

























***Exercise***

Find an integrating factor of the form  and solve the equation



***Solution***







For the equation to be exact, then

























***Exercise***

Find an integrating factor of the form  and solve the equation



***Solution***









For the equation to be exact, then

























***Exercise***

Find the general solution by using either Bernoulli 

***Solution***



Let 





|  |  |  |
| --- | --- | --- |
|  |  |  |
| **+** |  |  |
| **−** |  |  |











***Exercise***

Find the general solution by using either Bernoulli 

***Solution***



Let 



















***Exercise***

Find the general solution by using either Bernoulli 

***Solution***



Let 













***Exercise***

Find the general solution by using either Bernoulli 

***Solution***



Let  



















***Exercise***

Find the general solution by using either Bernoulli 

***Solution***



Let 















***Exercise***

Find the general solution by using either Bernoulli 

***Solution***





Let 

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **+** |  |  |
| **−** |  |  |















***Exercise***

Find the general solution by using homogeneous equations. 

***Solution***

Let 













***Exercise***

Find the general solution by using homogeneous equations. 

***Solution***





Let 





















***Exercise***

Find the general solution by using homogeneous equations. 

***Solution***





Let 













***Exercise***

Find the general solution by using homogeneous equations. 

***Solution***



Let 











***Exercise***

Find the general solution by using homogeneous equations. 

***Solution***



Let 



















***Exercise***

Find the general solution by using Equation with Linear Coefficients



***Solution***













Let 























***Exercise***

Find the general solution by using Equation with Linear Coefficients



***Solution***













Let 



















***Exercise***

Find the general solution by using Equation with Linear Coefficients



***Solution***













Let 

















***Exercise***

Find the general solution by using Equation with Linear Coefficients



***Solution***













Let 































***Exercise***

Prove that  has an integrating factor that depends only on the sum  if and only if the expression

 depends only on 

Use the prove to solve the equation 

***Solution***

An equation  has an integrating factor  iff 

For the equation to be exact, then















































***Exercise***

A portion of a uniform chain of length 8 *feet* is loosely coiled around a peg at the edge of a high horizontal platform, and the remaining portion of the chain hangs at rest over the edge of the platform.

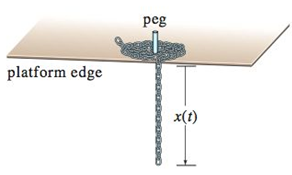
Suppose the length of the overhanging chain is 3 *feet*, that the chain weighs 2 , and that the positive direction is downward. Starting at  seconds, the weight of the overhanging portion causes the chain on the table to uncoil smoothly and to fall to the floor. If  denotes the length of the chain overhanging the table at time , then  is its velocity. When all resistive forces are ignored, it can be shown that a mathematical model relating *v* to *x* is given by



1. Rewrite this model in differential form and solve the *DE* for *v* in terms of *x* by finding am appropriate integrating factor. Find an explicit solution .
2. Determine the velocity with which the chain leaves the platform.

***Solution***

1. 





















***Given***:  











1. The chain leaves the platform when 

