***Solution*** ***Section* 2.7 – First-Order Linear Equations**

***Exercise***

Write an equivalent first-order differential equation and initial condition for *y*. 

***Solution***











***Exercise***

Write an equivalent first-order differential equation and initial condition for 

***Solution***









***Exercise***

Use Euler’s method to calculate the first three approximations to the given initial value problem for the specified increment size. Calculate the exact solution and investigate the accuracy of your approximations. Round the results to four decimals



***Solution***









































***Exercise***

Use Euler’s method to calculate the first three approximations to the given initial value problem for the specified increment size. Calculate the exact solution and investigate the accuracy of your approximations. Round the results to four decimals



***Solution***











































***Exercise***

Use Euler’s method to calculate the first three approximations to the given initial value problem for the specified increment size. Calculate the exact solution and investigate the accuracy of your approximations. Round the results to four decimals



***Solution***









































***Exercise***

Use Euler’s method to calculate the first three approximations to the given initial value problem for the specified increment size. Calculate the exact solution and investigate the accuracy of your approximations. Round the results to four decimals



***Solution***









































***Exercise***

Use the Euler method with  to estimate  if  and . What is the exact value of ?

***Solution***



















































***Exercise***

Use Euler’s Method to solve  on the interval  and taking . Compare the approximation to the values of the exact solution.

***Solution***

y(t) = 2\*exp(t) – 1

Euler Method

*t* Approx. Exact Difference

--------------------------------------------------------

0.00 | 1.00000000 | 1.00000000 | 0.00000000

0.05 | 1.10000000 | 1.10254219 | 0.00254219

0.10 | 1.20500000 | 1.21034184 | 0.00534184

0.15 | 1.31525000 | 1.32366849 | 0.00841849

0.20 | 1.43101250 | 1.44280552 | 0.01179302

0.25 | 1.55256313 | 1.56805083 | 0.01548771

0.30 | 1.68019128 | 1.69971762 | 0.01952633

0.35 | 1.81420085 | 1.83813510 | 0.02393425

0.40 | 1.95491089 | 1.98364940 | 0.02873851

0.45 | 2.10265643 | 2.13662437 | 0.03396794

0.50 | 2.25778925 | 2.29744254 | 0.03965329

0.55 | 2.42067872 | 2.46650604 | 0.04582732

0.60 | 2.59171265 | 2.64423760 | 0.05252495

0.65 | 2.77129828 | 2.83108166 | 0.05978337

0.70 | 2.95986320 | 3.02750541 | 0.06764222

0.75 | 3.15785636 | 3.23400003 | 0.07614367

0.80 | 3.36574918 | 3.45108186 | 0.08533268

0.85 | 3.58403664 | 3.67929370 | 0.09525707

0.90 | 3.81323847 | 3.91920622 | 0.10596775

0.95 | 4.05390039 | 4.17141932 | 0.11751893

1.00 | 4.30659541 | 4.43656366 | 0.12996825

***Exercise***

Use Euler’s Method to solve  on the interval  and taking . Compare the approximation to the values of the exact solution.

***Solution***









***t Euler Method Exact Difference***

0.000 3.0 3.0 0.0

0.100 3.6 3.70103418 0.10103418

0.200 4.392 4.65812166 0.26612166

0.300 5.44608 5.9811466 0.5350666

0.400 6.8620608 7.83508942 0.97302862

0.500 8.78343782 10.47102887 1.68759105

0.600 11.41846917 14.27646374 2.85799457

0.700 15.07237931 19.85810604 4.78572673

0.800 20.19698827 28.17999386 7.98300559

0.900 27.46790405 40.79715256 13.32924851

1.000 37.90570759 60.25661077 22.35090318

***Exercise***

Verify that the given function *y* is a solution of the differential equation that follows it. Assume that  are arbitrary constants. 

***Solution***





 ***√***

***Exercise***

Verify that the given function *y* is a solution of the differential equation that follows it. Assume that  are arbitrary constants. 

***Solution***







 ***√***

***Exercise***

Verify that the given function *y* is a solution of the differential equation that follows it. Assume that  are arbitrary constants. 

***Solution***







 ***√***

***Exercise***

Verify that the given function *y* is a solution of the differential equation that follows it. Assume that  are arbitrary constants. 

***Solution***







 ***√***

***Exercise***

Verify that the given function *y* is a solution of the differential equation that follows it. Assume that  are arbitrary constants. 

***Solution***



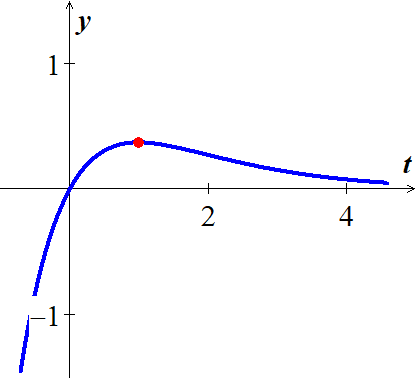






***Exercise***

Verify that the given function *y* is a solution of the differential equation that follows it. Assume that  are arbitrary constants. 

***Solution***









Hence, *C* = 0

The solution is: 

This function is defined and differentiable on the whole real line. Hence, the interval of existence is the whole real line.

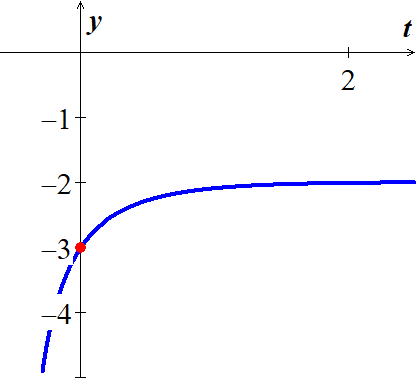
***Exercise***

Verify that the given function *y* is a solution of the differential equation that follows it. Assume that  are arbitrary constants. 

***Solution***











The solution is:





***Exercise***

Verify that the given function *y* is a solution of the initial value problem that follows it.



***Solution***



  *√*







  *√*

***Exercise***

Verify that the given function *y* is a solution of the initial value problem that follows it.



***Solution***





 *√*





 *√*

***Exercise***

Verify that the given function *y* is a solution of the initial value problem that follows it.



***Solution***





 *√*



 *√*







***Exercise***

Verify that the given function *y* is a solution of the initial value problem that follows it.



***Solution***





 *√*





 *√*





 *√*

***Exercise***

Find the general solution of the differential equation 

***Solution***













 Where 

***Exercise***

Find the general solution of the differential equation 

***Solution***

















***Exercise***

Find the general solution of the differential equation. If possible, find an explicit solution 

***Solution***











***Exercise***

Find the general solution of the differential equation. If possible, find an explicit solution 

***Solution***











***Exercise***

Find the general solution of the differential equation. If possible, find an explicit solution 

***Solution***











***Exercise***

Find the general solution of the differential equation. If possible, find an explicit solution



***Solution***

















***Exercise***

Find the general solution of the differential equation. If possible, find an explicit solution 

***Solution***



















***Exercise***

Find the general solution of the differential equation. If possible, find an explicit solution 

***Solution***















***Exercise***

Solve the differential equations: 

***Solution***













***Exercise***

Solve the differential equations: 

***Solution***















***Exercise***

Solve the differential equations: 

***Solution***



















***Exercise***

Solve the differential equations: 

***Solution***















***Exercise***

Solve the differential equations: 

***Solution***













***Exercise***

Solve the differential equations: 

***Solution***

















***Exercise***

Solve the differential equations: 

***Solution***



















***Exercise***

Find the general solution of 

***Solution***















***Exercise***

Find the general solution of 

***Solution***





















***Exercise***

Find the general solution of 

***Solution***



|  |  |  |
| --- | --- | --- |
|  |  |  |
| **+** | *t* |  |
| **−** | 1 |  |











***Exercise***

Find the general solution of 

***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***

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***

 Let 

















***Exercise***

Solve the differential equation 

***Solution***













***Exercise***

Solve the differential equation 

***Solution***













***Exercise***

Find the general solution of the differential equation 

***Solution***





***Exercise***

Find the general solution of the differential equation 

***Solution***





***Exercise***

Find the general solution of the differential equation 

***Solution***





***Exercise***

Find the general solution of the differential equation 

***Solution***









***Exercise***

Find the general solution of the differential equation 

***Solution***









***Exercise***

Find the general solution of the differential equation 

***Solution***





***Exercise***

Find the general solution of the differential equation 

***Solution***











***Exercise***

Find the general solution of the differential equation 

***Solution***









***Exercise***

Find the general solution of the differential equation 

***Solution***













***Exercise***

Find the general solution of the differential equation 

***Solution***







|  |  |  |
| --- | --- | --- |
|  |  |  |
| **+** | *y* |  |
| **−** | 1 |  |



***Exercise***

Find the general solution of the differential equation 

***Solution***











***Exercise***

Find the general solution of the differential equation 

***Solution***









***Exercise***

Find the general solution of the differential equation 

***Solution***













***Exercise***

Find the general solution of the differential equation 

***Solution***











***Exercise***

Find the general solution of the differential equation. 

***Solution***







***Exercise***

Find the general solution of the differential equation. 

***Solution***





***Exercise***

Find the general solution of the differential equation. 

***Solution***





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

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





***Exercise***

Find the general solution of 

***Solution***









***Exercise***

Find the general solution of 

***Solution***











***Exercise***

Find the general solution of 

***Solution***











***Exercise***

Find the general solution of 

***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 of 

***Solution***











***Exercise***

Solve the differential equation: 

***Solution***











***Exercise***

Solve the differential equation: 

***Solution***











***Exercise***

Solve the differential equation: 

***Solution***





|  |  |  |
| --- | --- | --- |
|  |  |  |
| **+** |  |  |
| **−** |  |  |
| **+** | 2 |  |











***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 of 

***Solution***









***Exercise***

Find the general solution of 

***Solution***

|  |  |  |
| --- | --- | --- |
|  |  |  |
| + |  |  |
| − | 1 |  |













***Exercise***

Solve the differential equation: 

***Solution***











***Exercise***

Solve the differential equation: 

***Solution***











***Exercise***

Find the general solution of 

***Solution***













***Exercise***

Solve the differential equation: 

***Solution***







***Exercise***

Solve the differential equation: 

***Solution***





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









***Exercise***

Solve the differential equation: 

***Solution***











***Exercise***

Find the general solution of 

***Solution***

















***Exercise***

Find the general solution of 

***Solution***













***Exercise***

Solve the differential equation: 

***Solution***





***Exercise***

Find the general solution of 

***Solution***

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













***Exercise***

Find the general solution of 

***Solution***















***Exercise***

Solve the differential equation: 

***Solution***









***Exercise***

Solve the differential equation: 

***Solution***











***Exercise***

Find the general solution of 

***Solution***











***Exercise***

Find the general solution of 

***Solution***













***Exercise***

Find the general solution of 

***Solution***











***Exercise***

Find the general solution of 

***Solution***



|  |  |  |
| --- | --- | --- |
|  |  |  |
| + |  |  |
| − | 1 |  |









***Exercise***

Solve the differential equation: 

***Solution***



|  |  |  |
| --- | --- | --- |
|  |  |  |
| **+** |  |  |
| **−** |  |  |
| **+** | 2 |  |









***Exercise***

Find the exact solution of the initial value problem. 

***Solution***













The negative value is taken to satisfy the initial condition.

***Exercise***

Find the exact solution of the initial value problem. 

***Solution***





































***Exercise***

Find the exact solution of the initial value problem. 

***Solution***

















***Exercise***

Find the exact solution of the initial value problem. 

***Solution***











***Exercise***

Find the exact solution of the initial value problem 

***Solution***

|  |  |  |
| --- | --- | --- |
|  |  |  |
| + |  |  |
| **−** | 1 |  |













***Exercise***

Find the exact solution of the initial value problem 

***Solution***







***Exercise***

Find the exact solution of the initial value problem. 

***Solution***



















***Exercise***

Find the exact solution of the initial value problem. 

***Solution***









***Exercise***

Find the exact solution of the initial value problem. 

***Solution***





















***Exercise***

Find the exact solution of the initial value problem. 

***Solution***











***Exercise***

Find the exact solution of the initial value problem. 

***Solution***













***Exercise***

Find the exact solution of the initial value problem. 

***Solution***













***Exercise***

Find the exact solution of the initial value problem. 

***Solution***













***Exercise***

Find the exact solution of the initial value problem. 

***Solution***

















***Exercise***

Find the exact solution of the initial value problem. 

***Solution***













***Exercise***

Find the exact solution of the initial value problem 

***Solution***

















***Exercise***

Find the exact solution of the initial value problem 

***Solution***













***Exercise***

Find the exact solution of the initial value problem 

***Solution***















***Exercise***

Find the exact solution of the initial value problem 

***Solution***













***Exercise***

Find the exact solution of the initial value problem 

***Solution***

















***Exercise***

Find the exact solution of the initial value problem 

***Solution***













***Exercise***

Find the exact solution of the initial value problem 

***Solution***



















***Exercise***

Find the exact solution of the initial value problem 

***Solution***















***Exercise***

Find the exact solution of the initial value problem 

***Solution***













***Exercise***

Find the exact solution of the initial value problem 

***Solution***

















***Exercise***

Find the exact solution of the initial value problem 

***Solution***















***Exercise***

Find the exact solution of the initial value problem 

***Solution***





















***Exercise***

Find the exact solution of the initial value problem 

***Solution***









***Exercise***

Find the exact solution of the initial value problem 

***Solution***















***Exercise***

Find the exact solution of the initial value problem 

***Solution***













***Exercise***

Find the general solution of 

***Solution***

















***Exercise***

Find the general solution of 

***Solution***























***Exercise***

Find the solution of the initial value problem 

***Solution***



















Given , then









***Exercise***

Solve the initial value problem: 

***Solution***



















***Exercise***

Solve the initial value problem: 

***Solution***

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

















***Exercise***

Solve the initial value problem: 

***Solution***



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

















***Exercise***

Solve the initial value problem: 

***Solution***

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



















***Exercise***

Solve the initial value problem: 

***Solution***

















***Exercise***

Solve the initial value problem: 

***Solution***























***Exercise***

Solve the initial value problem: 

***Solution***





















***Exercise***

Solve the initial value problem: 

***Solution***



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



















***Exercise***

Solve the initial value problem: 

***Solution***





















***Exercise***

Solve the initial value problem: 

***Solution***

















***Exercise***

Solve the initial value problem: 

***Solution***

















***Exercise***

Solve the initial value problem: 

***Solution***











***Exercise***

Solve the initial value problem: 

***Solution***





















***Exercise***

Solve the initial value problem: 

***Solution***





















***Exercise***

Solve the initial value problem: 

***Solution***

















***Exercise***

Solve the initial value problem: 

***Solution***



















***Exercise***

Solve the initial value problem: 

***Solution***





















***Exercise***

Solve the initial value problem: 

***Solution***



















***Exercise***

Solve the initial value problem: 

***Solution***























***Exercise***

Solve the initial value problem: 

***Solution***

















***Exercise***

Solve the initial value problem: 

***Solution***



















***Exercise***

Solve the initial value problem: 

***Solution***















***Exercise***

Solve the initial value problem: 

***Solution***



















***Exercise***

Solve the initial value problem: 

***Solution***

















***Exercise***

Solve the initial value problem: 

***Solution***















***Exercise***

Solve the initial value problem: 

***Solution***

























***Exercise***

Solve the initial value problem: 

***Solution***



























***Exercise***

Solve the initial value problem: 

***Solution***



















***Exercise***

Solve the initial value problem: 

***Solution***

















***Exercise***

Solve the initial value problem: 

***Solution***





















***Exercise***

Solve the initial value problem: 

***Solution***



















***Exercise***

Solve the initial value problem: 

***Solution***





















***Exercise***

Solve the initial value problem: 

***Solution***



|  |  |  |
| --- | --- | --- |
|  |  |  |
| **+** |  |  |
| **−** | 1 |  |

















***Exercise***

Solve the initial value problem: 

***Solution***



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













***Exercise***

Solve the initial value problem: 

***Solution***



















***Exercise***

Solve the initial value problem: 

***Solution***



























***Exercise***

Find the solution of the initial value problem 

***Solution***





















***Exercise***

Find the solution of the initial value problem 

***Solution***



















***Exercise***

Find the solution of the initial value problem 

***Solution***

















***Exercise***

Find the solution of the initial value problem 

***Solution***























***Exercise***

Find the solution of the initial value problem 

***Solution***



















***Exercise***

Find the solution of the initial value problem 

***Solution***



















***Exercise***

Find the solution of the initial value problem 

***Solution***

















***Exercise***

Find the solution of the initial value problem 

***Solution***









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















***Exercise***

Solve the initial value problem: 

***Solution***

























***Exercise***

Solve the initial value problem: 

***Solution***























***Exercise***

Solve the initial value problem: 

***Solution***























***Exercise***

Solve the initial value problem 

***Solution***



















***Exercise***

Solve the initial value problem 

***Solution***





















The interval of existence will be the interval containing  and 



***Exercise***

Find the general solution of 

***Solution***























***Exercise***

Find the general solution of 

***Solution***























***Exercise***

Solve the initial value problem 

***Solution***















***Exercise***

Solve the initial value problem 

***Solution***













***Exercise***

Solve the initial value problem 

***Solution***









 *Since the initial value is positive*









***Exercise***

Solve the initial value problem 

***Solution***



















***Exercise***

Solve the initial value problem 

***Solution***





















***Exercise***

Solve the initial value problem 

***Solution***



















***Exercise***

Solve the initial value problem 

***Solution***



















***Exercise***

Solve the initial value problem 

***Solution***



















***Exercise***

Solve the initial value problem 

***Solution***





















***Exercise***

Solve the initial value problem 

***Solution***



























***Exercise***

Solve the initial value problem 

***Solution***

















 Since 

***Exercise***

Solve the initial value problem 

***Solution***





















***Exercise***

Solve the initial value problem 

***Solution***

















***Exercise***

Solve the initial value problem 

***Solution***

















