***Chapter*  4 - Laplace Transform**

***Solution Section* 4.1- Definition of the Laplace Transform**

***Exercise***

Use Definition of Laplace transform to find the Laplace transform of 

***Solution***







 



***Exercise***

Use Definition of Laplace transform to find the Laplace transform of 

***Solution***







 



***Exercise***

Use Definition of Laplace transform to find the Laplace transform of 

***Solution***





 

 





 



***Exercise***

Use Definition of Laplace transform to find the Laplace transform of 

***Solution***



 *Integrating by parts*









 

 



















***Exercise***

Use Definition of Laplace transform to find the Laplace transform of 

***Solution***



***Exercise***

Use Definition of Laplace Transform to show the Laplace transform of  is 

***Solution***



***Solution Section* 4.2 - Basic Properties of the Laplace Transform**

***Exercise***

Find the Laplace transform and defined the time domain of 

***Solution***









***Exercise***

Find the Laplace transform and defined the time domain of 

***Solution***











***Exercise***

Transform the initial value problem into an algebraic equation involving . Solve the resulting equation for the Laplace transform of y.



***Solution***







Let , then











***Exercise***

Transform the initial value problem into an algebraic equation involving . Solve the resulting equation for the Laplace transform of y.



***Solution***







Let , then











***Exercise***

Transform the initial value problem into an algebraic equation involving . Solve the resulting equation for the Laplace transform of y.



***Solution***

***Exercise***

Transform the initial value problem into an algebraic equation involving . Solve the resulting equation for the Laplace transform of y.



***Solution***

***Exercise***

Find the Laplace transform of 

***Solution***











***Exercise***

Find the Laplace transform of 

***Solution***



 *Using Derivative of a Laplace Transform Proposition*





***Exercise***

Find the Laplace transform of 

***Solution***



 *Using Derivative of a Laplace Transform Proposition*















***Exercise***

Find the Laplace transform of 

***Solution***











***Exercise***

Find the Laplace transform of 

***Solution***



 *Using Derivative of a Laplace Transform Proposition*





 ***OR*** *Using Laplace Transform table*

***Exercise***

Transform the initial value problem into an algebraic equation involving . Solve the resulting equation for the Laplace transform of *y*.



***Solution***

Let , then

*Left side*;







*Right side*;



 *Using Derivative of a Laplace Transform Proposition*



Therefore,







***Exercise***

Transform the initial value problem into an algebraic equation involving . Solve the resulting equation for the Laplace transform of *y*.



***Solution***

Let , then

*Left side*;







*Right side*;



 *Using Laplace Transform table*







***Exercise***

Transform the initial value problem into an algebraic equation involving . Solve the resulting equation for the Laplace transform of *y*.



***Solution***



















***Solution Section* 4.3 - Inverse Laplace Transform**

***Exercise***

Find the inverse Laplace Transform of 

***Solution***

 *Factor*







***Exercise***

Find the inverse Laplace Transform of 

***Solution***





Thus, by linearity;





***Exercise***

Find the inverse Laplace Transform of 

***Solution***







***Exercise***

Find the inverse Laplace Transform of 

***Solution***





***Exercise***

Find the inverse Laplace Transform of 

***Solution***









***Exercise***

Find the inverse Laplace Transform of 

***Solution***









***Exercise***

Find the inverse Laplace Transform of 

***Solution***











***Exercise***

Find the inverse Laplace Transform of 

***Solution***











***Exercise***

Find the inverse Laplace Transform of 

***Solution***











***Exercise***

Find the inverse Laplace Transform of 

***Solution***







 







***Exercise***

Find the inverse Laplace Transform of 

***Solution***

Use partial fraction















***Exercise***

Find the inverse Laplace Transform of 

***Solution***

















***Exercise***

Find the inverse Laplace Transform of 

***Solution***



















***Exercise***

Find the inverse Laplace Transform of 

***Solution***



















***Exercise***

Find the inverse Laplace Transform of 

***Solution***

















***Solution Section* 4.4 - Using Laplace Transform to Solve Differential Equations**

***Exercise***

Solve using the Laplace transform: 

***Solution***













Using partial fraction:













***Exercise***

Solve using the Laplace transform: 

***Solution***

Let , then











Using partial fraction:













***Exercise***

Solve using the Laplace transform: 

***Solution***



 





Using partial fraction:















***Exercise***

Solve using the Laplace transform: 

***Solution***





 







Using partial fraction:















***Exercise***

Solve using the Laplace transform: 

***Solution***





 







Using partial fraction:

















***Exercise***

Solve using the Laplace transform: 

***Solution***





 

























***Exercise***

Solve using the Laplace transform: 

***Solution***





 

























***Exercise***

Solve using the Laplace transform: 

***Solution***





 



















***Exercise***

Solve using the Laplace transform: 

***Solution***





 

























***Exercise***

Solve using the Laplace transform: 

***Solution***





 





























***Exercise***

Solve using the Laplace transform: 

***Solution***



 



























***Exercise***

Solve using the Laplace transform: 

***Solution***















***Exercise***

Given: 

1. Show that the general solution is:  and find 
2. Use Laplace transform to solve the system

***Solution***









***Solution Section* 4.5 - Basic Electrical Circuits**

***Exercise***

A resistor  and a capacitor of  are joined in series with an electronic force (emf)  and no charge on the capacitor at . Find the ensuing charge on the capacitor at time *t* for the given 

***Solution***







 





















***Exercise***

A resistor  and a capacitor of  are joined in series with an electronic force (emf)  and no charge on the capacitor at . Find the ensuing charge on the capacitor at time *t* for the given 

***Solution***





 



















***Exercise***

A resistor  and a capacitor of  are joined in series with an electronic force (emf)  and no charge on the capacitor at . Find the ensuing charge on the capacitor at time *t* for the given 

***Solution***





 























***Exercise***

An inductor  and a resistor  are joined in series with an electronic force (emf)  and no charge on the capacitor at . Find the ensuing charge current in the current at time *t* for the given 

***Solution***







 





















***Exercise***

An inductor  and a resistor  are joined in series with an electronic force (emf)  and no charge on the capacitor at . Find the ensuing current in the current at time *t* for the given 

***Solution***







 





















***Exercise***

An inductor  and a resistor  are joined in series with an electronic force (emf)  and no charge on the capacitor at . Find the ensuing current in the current at time *t* for the given 

***Solution***







 



















