Given that:

Observing that the equation valid for all Dividing both sides of the equation, we get:

With the initial condition: , it leads to:

Hence, the solution of the equation is:

Or:

Given that:

Where:

And:

Therefore the given differential equation is exact.

Solve the given differential equation:

Integrating both sides we obtain the final result:

Given that:

Where:

Characteristic equation of the given ODE:

So, the complement solution is:

Since the right hand side of the given equation has two terms and , therefore the particular solution also has two term: , respectively.

Solve fore from:

Since, is not a root of characteristic equation.

So, has the following form:

Substituting into the equation we obtain:

Therefore:

Solve fore from:

Since, is not a root of characteristic equation.

So, has the following form:

Substituting into the equation we obtain:

Therefore:

So:

Thus, the general solution of the given differential equation is:

Given that:

It holds that the homogeneous equation:

Assume that is a solution of the given homogeneous equation

We have: .

We know that is a solution of , therefore substituting into , we get:

Thus, with any constant and , is a solution of

To find the general solution of , we rewire in the following form:

The Wronskian determinant for the equation is:

Hence:

Choose: for it leads to:

Choose

Since, the Wronskian determinant different from 0 for all , therefore and are linearly independence solutions of the homogeneous equation.

Clearly, is a particular solution of

Thus, the general solution of the equation is:

Due to Newton’s Cooling Law:

Where:

: Temperature of a body at time .

: Positive constant characteristic of the system.

: Environment temperature.

With the condition given in the prolem:

From , Solve for , we obtain:

If , Solve for , we get (hour) (minutes)

Therefore, the victim is killed at around 7:49 AM