[Question 1]

*(1.1) Determine whether the system*

*is degenerate. In the degenerate case, decide whether it has no solution or in definitely many solutions. If it has no solution, explain why, else find the general form of the solutions.*

[1] Rewrite the given system of differential equations

[2] Combine the Equations

We have:

*&*

[3] substitute x into [2]

*Therefore, equation (1) is consistent with the substitution.*

[4] substitute x into [2]

*Therefore, equation (1) is* ***inconsistent*** *with the substitution.*

*Therefore, the system is* ***inconsistent &*** *no values of 𝑥(𝑡) and y(t) that can simultaneously satisfy both differential equations.*

*(1.2) Solve the system*

*by using the elimination method (operator method).*

*Hint. Eliminate y first.*

[1] Rewrite the given system of differential equations

[2] Eliminate y

[3] Solve for

[4] Substitute into [2]

[5] Solve for y

[6] Substitute into [1]

[7] Solve for x

[Question 2]

*Show that the system:*

*is equivalent to both the following triangular systems:*

*and*

[Question 3]

[Question 4]

[Question 5]

[Question 5]

[Question 6]

[Question 7]