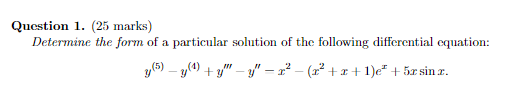
Q1



Let

CE:

We have , then

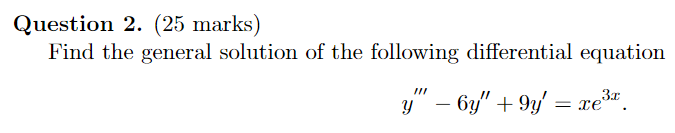
+ For , with is double root of CE

+ For , with is single root of CE

+ For , with is single root of CE

Thus,

Q2)



CE:

Therefore, the complement solution is

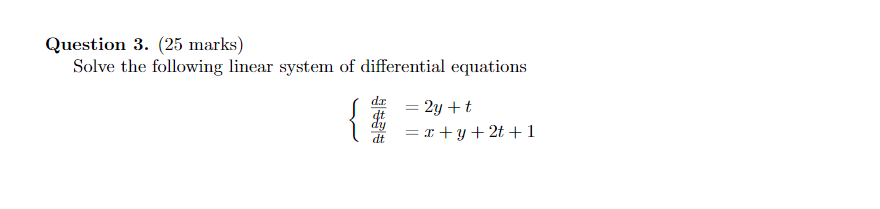
For , with is double root of CE

Substitute into , we obtain

Therefore,

Thus,

Q3)



Differentiating both sides with respect to of equation , we get

Taking , we obtain

Substituting into , it leads to

This is second order non-homogeneous differential equation

CE:

We have with is not a root of CE, therefore

Substitute into yields

Hence

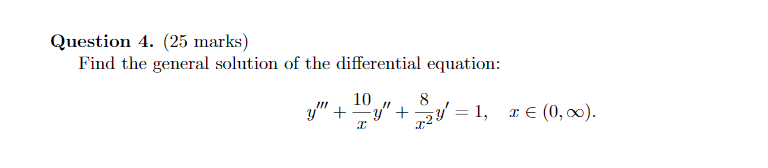
Thus,

Then

From :

Thus

Q4)



First we have to find complement solutions of which are solution of the homogenous equation

Assume that is a solution of .

Substitute into , we get

Assume that is a solution of .

Substitute into , we get

Since, with , is a solution of above equation, so

Let

Since, are solutions of and satisfy Wronskian determinant different from zero for .

Therefore,

Find particular solution:

By variation of parameters, we have

To find and , we have to solve the following system of equations

Let :

Form :

Form :

So,