**Question 1**

1.1.

ODE: second order linear nonhomogenous

**[1] Find roots related homogenous equation**

Characteristic equation

or

**[2] Solution of homogenous equation**

Use the method of variation of constants, where the general solution is of the form

**[2] Solution of nonhomogenous equation**

Use the method of undetermined coefficients, where the integral solution is of the form

We have that

,

The general solution of the nonhomogenous equation is of the form

Hence,

Question 2

**Given**

grams salt

350 of water

Pumping rate /min

**Let**

be the amount of salt in the tank

be the rate of incoming salt

be the rate of outgoing salt

/

ODE: first order linear

Integrate:

Question 3

Question 4

Question 5