**MTH401 Assignment #2 Spring 2023**

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**Question:**

Find General solution of 𝑦" − 4𝑦′ + 4𝑦 = (𝑥 + 1)2𝑥, using Variation of Parameters.

**Solution:**

First we need to solve the associated homogeneous equation, and then find the particular solution.

**Homogeneous Solution:**

The given equation is:

.

Now, we assume a solution of the form:

yh (x) = emx

Here m is constant and after substituting into the equation, we will get characteristic equation:

m2 – 4m + 4 = 0

After solving the above equation, we find that m = 2 is a repeated root.

Therefore, the homogeneous solution is:

**Particular Solution:**

Let:

,





 = e4x ≠ 0

Given equation is:

So, the identity of function is:

f = (x + 1)e2x

Now solve this further for final particular solution,

.

**Final Particular Solution:**

yp = xe4x

**General Solution:**

To find the general solution, we need to add both the equation.

y = yc + yp

yc = c1 e2x + c2 xe2x + xe4x