a)

b)

Given that:

Let , it holds that:

Taking Laplace transform both sides of , we obtain:

Thus, the solution of the given differential equation is:

Given that:

Let , it holds that:

Taking -transform both side of , we obtain:

Thus, the solution of the given system difference equations is:

a)

Let: , it leads to:

Thus

b)

Given that:

The half range sine series is given by:

Where:

Thus,

Since, we have is an even function on which leads to

The Fourier series is given by:

Since we have:

Therefore,