a)

Rewrite as unit step function we have:

b)

Given that:

Let , it holds that:

Taking Laplace transform both sides of , we obtain:

Thus, the solution of the given differential equation is:

Use the below formula and shifting theorem

a)

Given that:

Let , it holds that:

Taking -transform both side of , we obtain:

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

b)

Using definition of -transform, we have:

Since, we know that:

Thus,

The Fourier series is given by:

Since we have:

Therefore,