a)

b) Let:

Therefore, in polar form, can be expressed as:

Since we know that:

So

Thus,

a)

Let:

Since, we know that:

Therefore, there is exist 3 cubic roots of as follows:

b)

1. Laplace equation for

Since, only one point or satisfies Laplace equation , but is not included in the considered domain. Therefore, the function is not satisfies the Laplace equation

2. Assume that and are already satisfied Cauchy-Riemann equation:

From and , we get contradiction which implies that and never satisfied Cauchy-Riemann equation. Therefore, there is no complex analytic function whose real part is

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:

Apply power series for analyzing this problem:

We have:

With , it holds that:

With , it holds that:

Therefore,