a)

b) Let

Since we know that:

Therefore,

However,

Hence,

Or it equivalent with

a)

1. For any , we have:

The limit exists which leads to is continuous at any or everywhere

2.

Clearly,

The given complex function is not satisfied first equation of Cauchy-Riemann equation which implies nowhere differentiable.

From both reasons above, is continuous at everywhere but nowhere differentiable.

b)

Apply power series for analyzing this problem:

We have:

With , it holds that:

With , it holds that:

Therefore,

# 

a)

b)

Since we have:

Therefore,

Given that:

Let , it holds that:

Taking Laplace transform both sides of , we obtain:

Thus, the solution of the given differential equation is: