Convert the complex number 1 + i into polar form then exponential form

To convert the complex number 1 + i into polar form and then exponential form, we follow these steps:

1. Polar Form

The polar form of a complex number a + bi is given by:

r(cos(θ) + isin(θ))

Where:

- r is the magnitude of the complex number

- θ is the argument (or angle) of the complex number

Magnitude r:

r = sqrt(a^2 + b^2)

For 1 + i, a = 1 and b = 1:

r = sqrt(1^2 + 1^2) = sqrt(1 + 1) = sqrt(2)

Argument θ:

θ = tan^(-1)(b/a)

For 1 + i:

θ = tan^(-1)(1) = π/4

Thus, the polar form is:

sqrt(2) (cos(π/4) + isin(π/4))

2. Exponential Form

The exponential form of a complex number is given by:

re^(iθ)

Using the values of r and θ calculated:

sqrt(2) e^(iπ/4)

Summary

Polar Form: sqrt(2) (cos(π/4) + isin(π/4))

Exponential Form: sqrt(2) e^(iπ/4)