

Complex Powers

Quiz: Complex Powers. $(1 + i)^4 = ?$

Choices:

- a) -1
- b) 4
- c) -4
- d) $-\sqrt{2}$
- e) $4i$
- f) None of the above

Answer:

In polar form

$$1 + i = \sqrt{2}e^{i\pi/4}.$$

Thus,

$$(1 + i)^4 = (\sqrt{2}e^{i\pi/4})^4 = 4e^{i\pi} = -4.$$

These powers all lie on a spiral emanating from the origin.

The answer is (c). (Thus, $(1 + i)$ is a fourth root of -4 .)

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