Problem 1

In each of Problems 1 through 6, use Euler’s formula to write the given expression in the form \( a + ib \).

\[ \exp(1 + 2i) \]

Solution

Euler’s formula states that \( e^{ix} = \cos x + i \sin x \). Split up the exponential function first and then use the formula.

\[
\exp(1 + 2i) = e^{1+2i} \\
= e^1 e^{2i} \\
= e (\cos 2 + i \sin 2) \\
= e \cos 2 + ie \sin 2 \\
\approx -1.13 + 2.47i
\]