Exercise 50

For the following exercises, evaluate the expressions, writing the result as a simplified complex number.

$$\frac{1}{i^{11}} - \frac{1}{i^{21}}$$

Solution

Simplify the given expression.

$$\begin{aligned}
\frac{1}{i^{11}} - \frac{1}{i^{21}} &= \frac{i}{i^{12}} - \frac{i^3}{i^{24}} \\
&= \frac{i}{(i^4)^3} - \frac{i^3}{(i^4)^6} \\
&= \frac{i}{(1)^3} - \frac{i^3}{(1)^6} \\
&= \frac{i}{1} - \frac{i^3}{1} \\
&= i - i^3 \\
&= i - i^2 \cdot i \\
&= i - (-1) \cdot i \\
&= i - (-i) \\
&= i + i \\
&= 2i
\end{aligned}$$