

$$\begin{aligned}
& (q+q^{-1})^2 - 3q(q+q^{-1}) + 3q^2(q+q^{-1})^2 - q^3(q+q^{-1})^3 \\
= & q^{-2} + 1 + q^2 - q^6 \xrightarrow[\text{(with } (n_+, n_-) = (3, 0))]{\cdot (-1)^{n_-} q^{n_+ - 2n_-}} q + q^3 + q^5 - q^9 \xrightarrow{\cdot (q+q^{-1})^{-1}} J(\mathcal{Q}) = q^2 + q^6 - q^8.
\end{aligned}$$