When performing LTL model checking, the product automaton $\mathcal{A}_{\mathcal{M}} \times \mathcal{A}_{\phi}$ is constructed. Construct the product automaton $\mathcal{A}_{\mathcal{M}} \times \mathcal{A}_{\phi}$ for the Büchi Automata below. Does the resulting automaton contain an execution path that visits an accepting state infinitely often? If so, give an example of one such path.

$\{p, q\}$

A B

$\emptyset, \{p\}, \{q\}, \{p, q\}$

$\emptyset, \{p\}, \{q\}, \{p, q\}$ $\{p, q\}$

0 $0A$ $0B$

$\{p\}$

1 $1A$ $1B$

$\{p, q\}$ $\{p\}$

2 $2A$ $2B$

$\{q\}$ $\{p, q\}$

3 $3A$ $3B$

$\{q\}$