1. Derive a program fragment $S$ that does not contain the multiplication operator. Show the derivation and a proof of the correctness of your solution.

$$
\begin{array}{l}
[| \text{con } X,Y : int \{ \; X \geq 0 \land Y \geq 0 \; \}; \\
\quad \text{var } z : int \\
\quad \quad \{ z : z = X \times Y \} \\
|]
\end{array}
$$

2. Derive a program fragment $S$ that does not contain an exponentiation. Show the derivation and the proof obligations.

$$
\begin{array}{l}
[| \text{con } N : int \{ \; N \geq 0 \; \}; \\
\quad \text{var } b[0..N) : \text{array of } int \\
\quad \quad \{ z : z = \sum_{0 \leq i < N} (-1)^i \times b.i \} \\
|]
\end{array}
$$