Software Engineering II

Consider the following code fragment, whose purpose is to form the product \( m \times n \) in the integer variable \( x \):

\[
x := 0; \quad i := n;
\text{while } i<>0 \text{ do}
\quad \begin{align*}
& x := x+m; \\
& i := i-1
\end{align*}
\text{end;}
\]

What is the loop invariant? \hfill [3 marks]

Argue informally that the invariant holds at the appropriate points. Using the invariant, show that the loop is correct. \hfill [5 marks]

Outline the main features of the Z specification language. \hfill [9 marks]

To what extent can a formal specification language help a safety-critical system meet the requirement of being extremely reliable? \hfill [3 marks]