Foundations of Computer Science

This question has been translated from Standard ML to OCaml

The OCaml variant type `bool`, defined below, is to be used to represent boolean expressions.

\[
\text{type bool} = \text{Var of string} \\
| \text{Not of bool} \\
| \text{And of bool * bool} \\
| \text{Or of bool * bool}
\]

The constructor `Var` is used to represent named boolean variables, and `Not`, `And` and `Or` are used to represent the corresponding boolean operators.

Define a function that will return a list of the distinct names used in a given boolean expression. \[4\text{ marks}\]

A context is represented by a list of strings corresponding to the boolean variables that are set to true. All other variables are deemed to be set to false. Define a function that will evaluate a given boolean expression in a given context. \[3\text{ marks}\]

Incorporate your two functions into a program that will determine whether a given boolean expression is true for all possible settings of its variables. \[3\text{ marks}\]