1996 Paper 1 Question 2

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.

```
type bool = Var of string
          | Not of bool
          | And of bool * bool
          | 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 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 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 marks]