Wang's Algorithm*
A Semantic Inference Method

To Show $A \models P$:

- Try to construct a truth table line in which A is True and P is false.

- If you succeed, $A \not\models P$.

- If you fail, $A \models P$.

*Wang, H. 1960. Toward Mechanical Mathematics. IBM Journal of Research and Development 4, 2-22. Reprinted in K. M. Sayre and F. J. Crosson (Eds.) The Modeling of Mind: Computers and Intelligence. Simon and Schuster, New York, 1963.

Implemented Wang Function

`(wang '(`$A_1, \ldots, A_n$`) '(`P`))`

Returns `T` if $A_1, \ldots, A_n \models P$;

`NIL` otherwise.

Using Wang's Algorithm on Axiom A1

```
(wang               '()    '((A => (B => A))))
 0: (WANG           NIL    ((A => (B => A))))
   1: (WANG         (A)    ((B => A)))
     2: (WANG       (B A)  (A))
     2: returned T
   1: returned T
 0: returned T
T
```

Using Wang's Algorithm on a Non-Theorem

```
(wang                    '() '((A => (A & B))))
 0: (WANG                NIL ((A => (A & B))))
   1: (WANG              (A) ((A & B)))
     2: (WANG            (A) (A))
     2: returned T
     2: (WANG            (A) (B))
     2: returned NIL
   1: returned NIL
 0: returned NIL
NIL
```

Using Wang's Algorithm to see if

$$JD, JD \Rightarrow BU, BU \Rightarrow \neg BD \models \neg BD$$

```
(wang             '(JD (JD => BU) (BU => (~ BD))) '((~ BD)))
 0: (WANG         (JD (JD => BU) (BU => (~ BD)))  ((~ BD)))
   1: (WANG       (BU JD (BU => (~ BD)))          ((~ BD)))
     2: (WANG     ((~ BD) BU JD)                  ((~ BD)))
     2: returned T
     2: (WANG     (BU JD)                        (BU (~ BD)))
     2: returned T
   1: returned T
   1: (WANG       (JD (BU => (~ BD)))            (JD (~ BD)))
   1: returned T
 0: returned T
T
```

Alternative View of Wang Function

(`wang` *KB Query*)
Returns `T` if the *Query* follows from the *KB*
`NIL` otherwise.