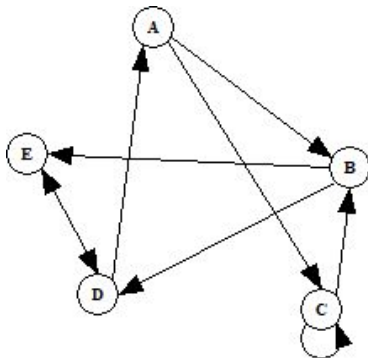


1. Graph Theory

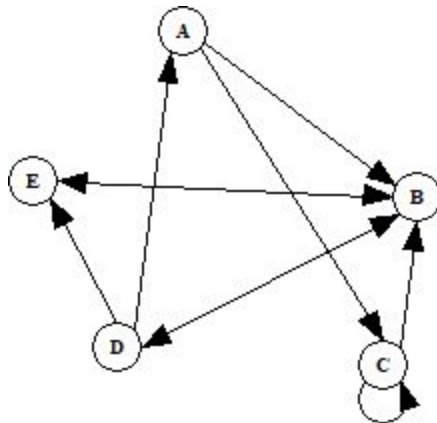
How many paths of length 3 from Vertex C in the following directed graph?



1.

2. Graph Theory

How many cycles are there from Vertex B in the following directed graph?



2.



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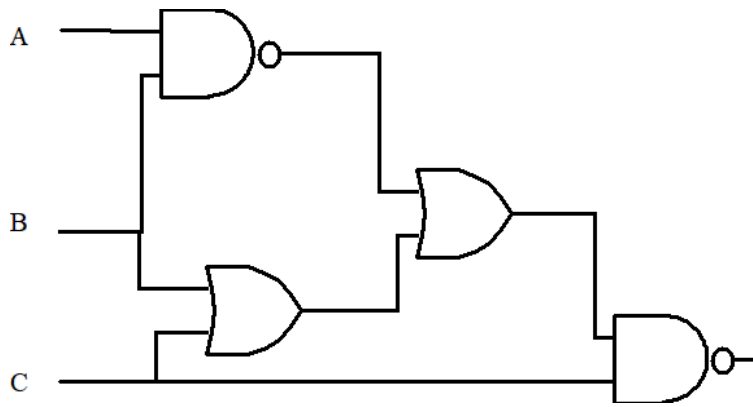
2019-2020

Contest #4

SENIOR DIVISION

3. Digital Electronics

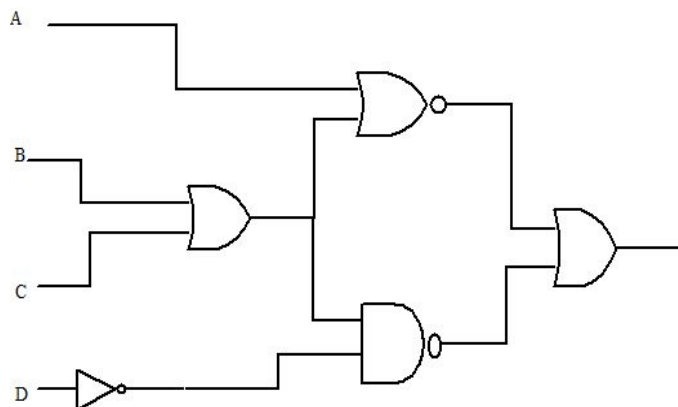
Simply the Boolean expression represented by the following digital circuit:



3.

4. Digital Electronics

How many ordered quadruples make the following digital circuit FALSE?



4.



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Contest #4

SENIOR DIVISION

5. Assembly Language

What would be output when this program is executed?

```
      X  DC    1
      Z  DC    0
TOP   LOAD    X
      MULT    X
      ADD     Z
      STORE   Z
      SUB     = 500
      BL      P
      LOAD    X
      PRINT   X
      END
P     LOAD    X
      ADD     = 1
      STORE   X
      BU      TOP
```

5.