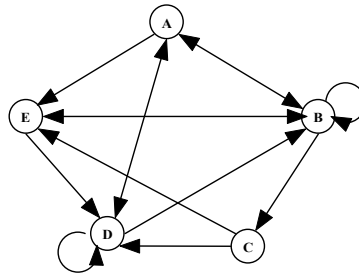


SENIOR DIVISION

1. Graph Theory

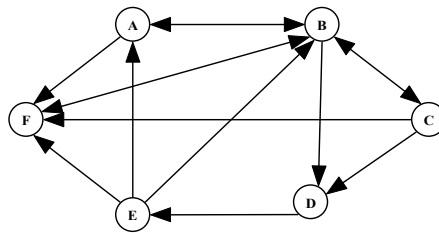
Which starting vertex has the most paths of length 3 in the directed graph at the right and how many are there?



1.

2. Graph Theory

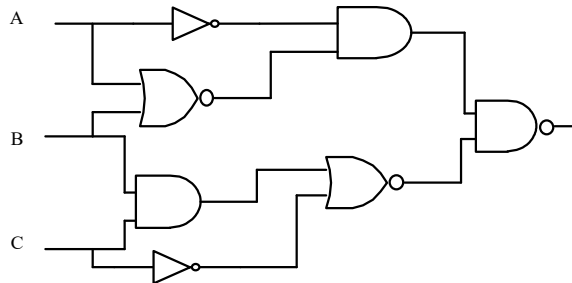
How many cycles exist from B in the directed graph at the right?



2.

3. Digital Electronics

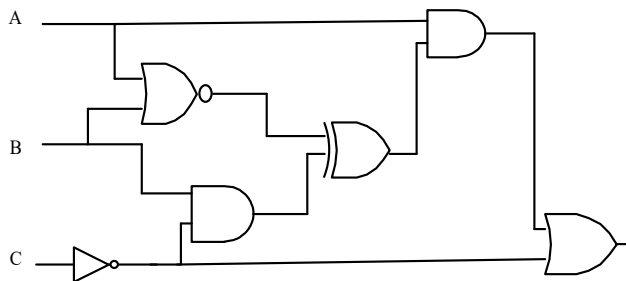
Which ordered triple(s) make the digital circuit at the right FALSE?



3.

4. Digital Electronics

Simplify the Boolean expression represented by the digital circuit at the right.



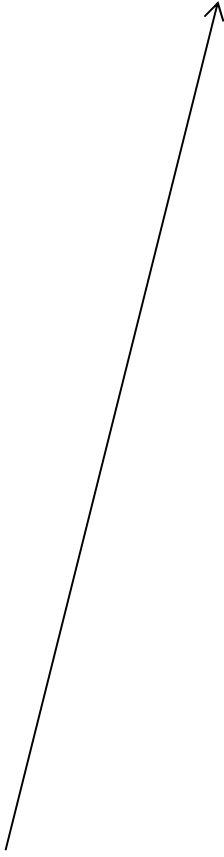
4.

SENIOR DIVISION

5. Assembly Language

What is the output of the following assembly program after it is executed?

```
A  DC  7325
B  DC  8
T  DC  0
LOAD  A
DIV   =10
STORE C
MULT  =10
STORE D
LOAD  A
SUB   D
STORE E
LOAD  C
DIV   =10
STORE D
MULT  =10
STORE H
LOAD  C
SUB   H
MULT  B
STORE F
LOAD  D
DIV   =10
STORE N
MULT  =10
STORE M
LOAD  D
SUB   M
```



```
MULT  B
MULT  B
STORE X
LOAD  N
MULT  B
MULT  B
MULT  B
STORE W
LOAD  T
ADD   W
ADD   E
ADD   F
ADD   X
STORE T
PRINT T
END
```

5.