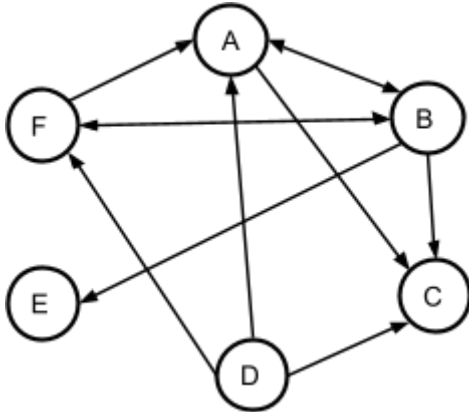


American Computer Science League

2023-2024 • Contest 4: Short Problems • Intermediate Division

1. Graph Theory

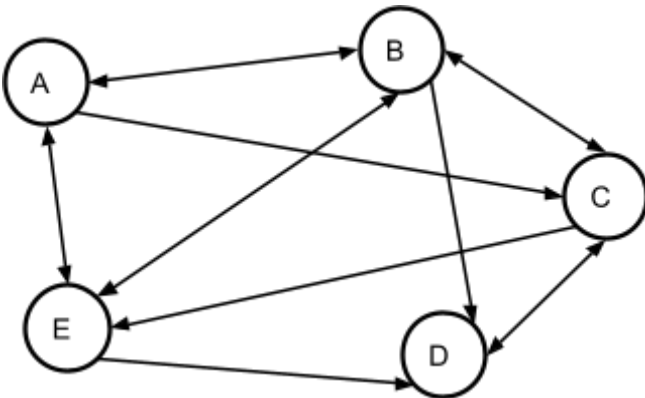
How many paths of length 2 are there in the following directed graph?



- A. 12
- B. 14
- C. 15
- D. 16
- E. 18

2. Graph Theory

How many cycles are there in the following directed graph from vertex A?



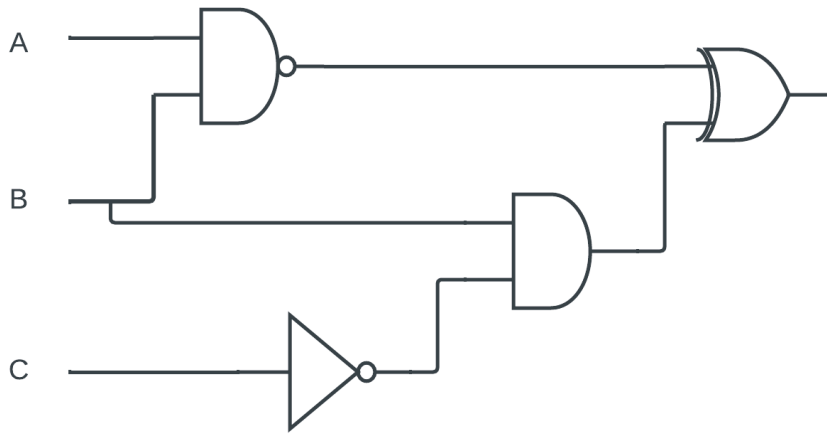
- A. 7
- B. 8
- C. 9
- D. 11
- E. 13

American Computer Science League

2023-2024 • Contest 4: Short Problems • Intermediate Division

3. Digital Electronics

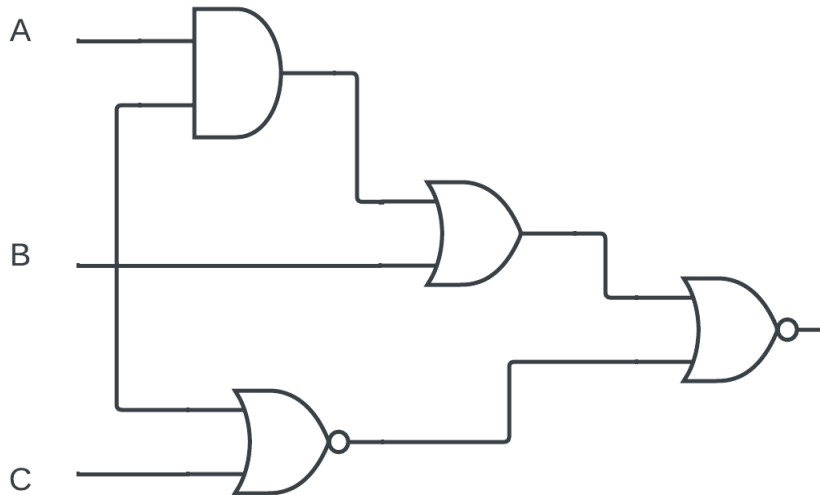
How many ordered triples make the following digital circuit TRUE?



- A. 2
- B. 4
- C. 5
- D. 6
- E. 8

4. Digital Electronics

Simplify the Boolean expression represented by the digital diagram below:



- A. $\overline{B}C$
- B. $\overline{B}\overline{C}$
- C. $\overline{B} * \overline{C}$
- D. $B\overline{C}$
- E. BC

American Computer Science League

2023-2024 • Contest 4: Short Problems • Intermediate Division

5. Assembly Language

What is the output when the following program is executed?

N	DC	1
T	DC	1
M	DC	78
	LOAD	T
TOP	SUB	M
	BE	STOP
	LOAD	N
	ADD	=1
	STORE	N
	LOAD	T
	ADD	N
	STORE	T
	BU	TOP
STOP	PRINT	N
	END	

- A. 11
- B. 12
- C. 13
- D. 14
- E. 15