American Computer Science League
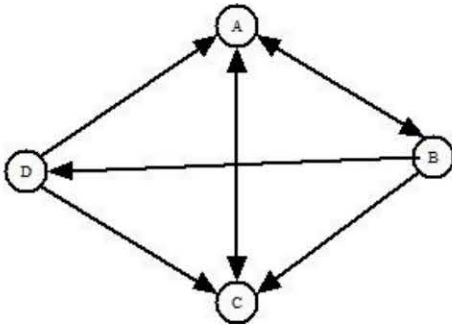
1. Graph Theory

Given the set of vertices: {A, B, C, D, E} and the set of directed edges: {AB, BE, AD, EA, CB, DB, BA, BC}, how many paths are there of length 2 from Vertex B?

A. 1
B. 2
C. 3
D. 4
E. 5

2. Graph Theory
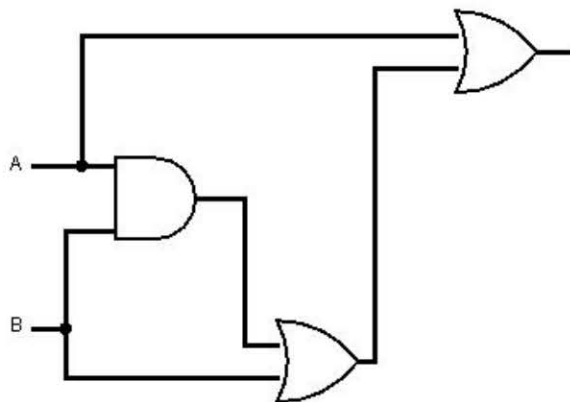
Given the following directed graph, how many cycles are there from A?
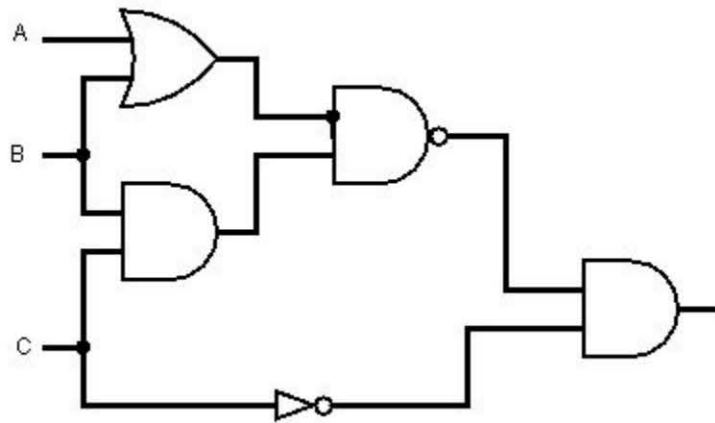

A. 7
B. 6
C. 5
D. 4
E. 3

3. Digital Electronics

Simplify the Boolean expression represented by the following digital circuit:

A. A
B. A+B
C. B
D. AB
E. 1

4. Digital Electronics

Identify all possible ordered triples that make the following digital circuit TRUE.

A. (*,*,0)
B. (*,0,1)
C. (*,*,1)
D. (0,*,1)
E. (0,*,*)

5. What Does This Program Do? (Strings)

What is the length of the longest substring of B in which the elements are in ascending alphabetical order?

```
a = "FOURTHACSLCONTEST"
b = ""

for x = 1 to len(a) - 2
        if a[x] > "O" then
             b = b + a[x+1]
        end if
        if a[x] < "O" then
             b = a[x-1] + b
        end if
next x
```

A. 2
B. 3
C. 4
D. 5
E. 6
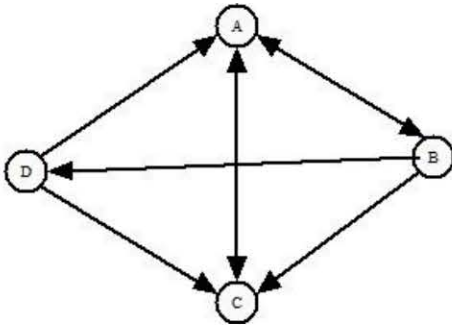
1. Graph Theory

给定顶点集合: {A, B, C, D, E} 和有向边集合:
{AB, BE, AD, EA, CB, DB, BA, BC}, 请问从顶点 B 出发有多少条长度为 2 的路径?

A. 1
B. 2
C. 3
D. 4
E. 5

2. Graph Theory

给定以下有向图，请问从 A 出发有多少个环？
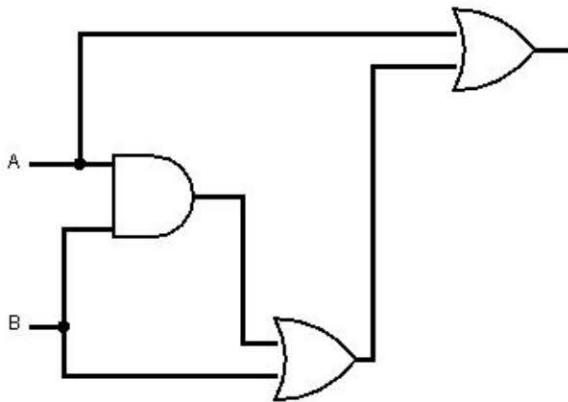

A. 7
B. 6
C. 5
D. 4
E. 3

3. Digital Electronics

化简下述用数字电路表示的布尔表达式:
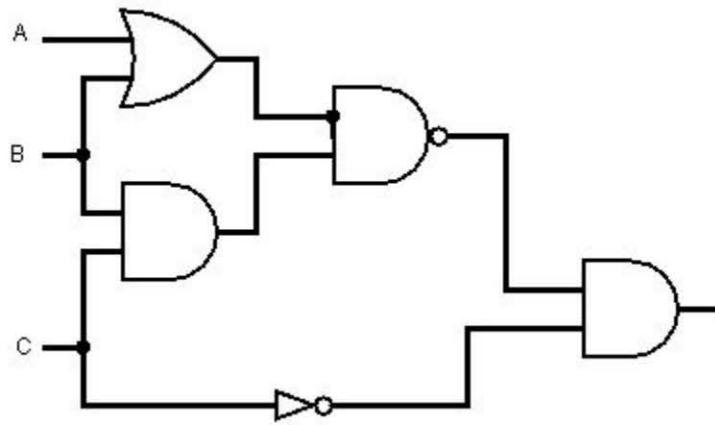

A. A
B. A+B
C. B
D. AB
E. 1

4. Digital Electronics

请找出所有可以使下述数字电路为**真**的有序三元组。

A. (*,*,0)
B. (*,0,1)
C. (*,*,1)
D. (0,*,1)
E. (0,*,*)

5. What Does This Program Do? (Strings)

元素按字母升序排列时，B 的最长子串长度是多少？

```
a = "FOURTHACSLCONTEST"
b = ""
for x = 1 to len(a) - 2
    if a[x] > "O" then
        b = b + a[x+1]
    end if
    if a[x] < "O" then
        b = a[x-1] + b
    end if
next x
```

A. 2
B. 3
C. 4
D. 5
E. 6