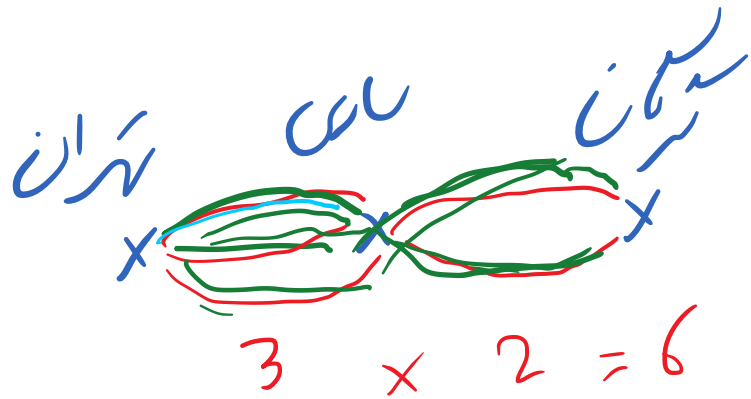


اصل ضرب: اگر یک اتفاق با m حالت مختلف قابل انجام باشد و اتفاق مستقل دیگری

با n حالت مختلف قابل انجام باشد، دو اتفاق همزمان با $m \times n$ حالت

مختلف قابل انجام هستند

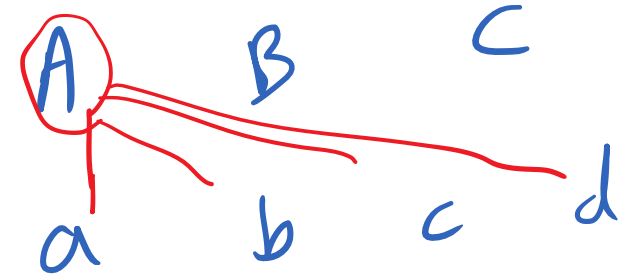


رنگ - پیراهن - شلوار - کفش - کلاه
2 × 3 = 6

Each day Carlo puts on his scarf and his hat. Given that he has three types of scarves and four types of hats, how many days can he go without repeating his head- and neck-wear?

- ☐ A. 4^3
- ☐ B. 24
- ☐ C. 3^4
- ☒ D. 12
- ☐ E. 7

Je $\rightarrow 3$
sk $\rightarrow 4$



$$3 \times 4 = 12$$

Aa	Ab	Ac	Ad
Ba	Bb	Bc	Bd
Ca	Cb	Cc	Cd

Ada, Bruna and Carlotta are discussing which of them is telling the truth.
Ada says that Bruna lies.
Bruna says that Carlotta lies.
Carlotta says that Ada and Bruna are both lying.
What can we conclude?

راست ✓
دروغ ✗

فرض اول: A راستگو

- ☐ A. Bruna and Carlotta are lying
- ☒ B. Bruna is telling the truth
- ☐ C. Ada and Carlotta are telling the truth
- ☐ D. Ada is telling the truth
- ☐ E. Carlotta is telling the truth

A ✓

B ✗

C ✓

تناقض با راستگوی A →

رسنتیم کی کمریم مزمین راستگوی A معلوم است

A ✗

B ✓

C ✗

Aldo, Bruno and Carlo raced each other. It is known that one of the following statements is false and the other two are true:

- | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---------------------------------------------------------------------------|
| <div style="border: 1px solid blue; padding: 5px; display: inline-block;"> <div style="display: flex; flex-direction: column; align-items: center;"> <div>✓</div> <div>✓</div> <div>✗</div> </div> </div> | ✗ | • Aldo did not finish third. A 3✗ |
| | ✗ | • Bruno did not finish second. B 2✗ |
| | ✓ | • Carlo finished before the others. C 1✓ |

Then it is necessarily true that

- ☐ A. Aldo finished first
- ☒ B. Aldo finished before Carlo
- ☐ C. Carlo finished first
- ☐ D. Carlo finished before Aldo
- ☐ E. Aldo finished third

~~B C A~~
~~C B A~~

~~A B C~~
~~C B A~~

A C B

~~B C A~~

~~A B C~~

B A C

Anna, Bruno, Claudia, Davide and Eva are five friends. The statements of each of them are either true or false:

Anna: I have green eyes. ~~x~~ ✓

Bruno: The square of an odd integer is odd. ✓

Claudio: Only one of the statements of my four friends is true. ~~x~~

Davide: $2^0 + 2^1 + 2^2 + 2^3 + 2^4 = 31$ ✓

Eva: What Anna says is false. ✓ ~~x~~

How many of these statements are true?

- ☐ A. Four
- ☐ B. Two
- ☒ C. Three
- ☐ D. One
- ☐ E. Five

Let X be the set of the integers that are odd or are multiples of 3 and let Y be the set of integers greater than 1 and less than 13. Then the intersection of X and Y is the set

التراب

☐ A. {3,6,9,12}

☐ B. {6,9,12}

☒ C. {3,5,6,7,9,11,12}

☐ D. {3,5,7,9,11}

☐ E. {1,3,5,6,7,9,11,12,13}

$X \cap Y = ?$

$Y = \{2, \textcircled{3}, 4, \textcircled{5}, \textcircled{6}, \textcircled{7}, 8, \textcircled{9}, 10, \textcircled{11}, \textcircled{12}\}$

ممکن است q اتفاق بیفتد
ولی p اتفاق نیفتد

حفظ \rightarrow if

p زمانی درست است که q درست باشد
(q شرط کافی برای p است)

$p \rightarrow q$ if

اگر q اتفاق نیفتد
 p حتماً اتفاق داده

$p \rightarrow q$ only if

p فقط زمانی درست باشد که q درست باشد
(q شرط لازم برای p است)

$p \rightarrow q$ and only if

q شرط لازم و کافی برای p است

برای اینکه q اتفاق نیفتد ولی
بلکه q اتفاق نیفتد
(ممکن است q اتفاق نیفتد ولی p اتفاق نیفتد)

اگر q اتفاق نیفتد حتماً p اتفاق نیفتد و اگر q اتفاق نیفتد p اتفاق نیفتد

If it is not true that [it is necessary to be male to be taller than 170 cm], then

دستیست

بایه مرد بانه تا قد بلندتر از ۱۷۰ باشد

- ☒ A. at least one female is taller than 170 cm
- ☐ B. it is necessary not to be male to be taller than 170 cm
- ☐ C. males and females are taller than 170 cm
- ☒ D. it is sufficient to be male to be taller than 170 cm
- ☒ E. it is not sufficient to be male to be taller than 170 cm

مرد
169
172
173
174

زن
160
162
171

only if : شرط لازم

if : شرط کافی

if and only if : شرط لازم و کافی

From the statement

Only the even integers can be divisible by 4

one can deduce that

نتیجہ لازم کرنا

2, 4, 6, 8, 10, ...
4, 8, 12, 16, 20, ...

6 → 4 X
6 → 2, 3 ✓

- ☐ A. being even is a condition neither necessary nor sufficient for an integer to be divisible by 4
- ☐ B. if an integer is not divisible by 4, then it is not even
- ☒ C. being even is a condition necessary for an integer to be divisible by 4
- ☐ D. being even is a condition sufficient for an integer to be divisible by 4
- ☐ E. being even is a condition necessary and sufficient for an integer to be divisible by 4

From the statement

it's necessary to have a license to drive a car

we can deduce that

- ☐ A. most license holders drive
- ☐ B. no license holders drive
- ☐ C. surely at least one license holder does not drive
- ☒ D. there could be people who have a driver's license but do not drive
- ☐ E. surely all license holders are drivers

Saying that it is necessary but not sufficient to be of legal age to exercise one's right to vote implies that

- ☒ A. there may be someone of legal age who cannot exercise his right to vote
- ☐ B. nobody of legal age can exercise their right to vote
- ☐ C. the majority of those of legal age exercise their right to vote
- ☐ D. certainly all those of legal age exercise their right to vote
- ☐ E. surely at least someone of legal age does not exercise his/her right to vote

From the ^{فرض} proposition

If two functions are differentiable, then their product is also differentiable
we can deduce that

- ☐ A. it is necessary that the two functions be differentiable in order that their product is differentiable
- ☐ B. the product of two functions is differentiable if and only if the two functions are differentiable
- ☐ C. all products of two functions are differentiable
- ☐ D. the product of two functions is differentiable only if the two functions are differentiable
- ☒ E. If the product of two functions is not differentiable then at least one of the two functions is not differentiable

DAAN ACADEMY

$\sim q \rightarrow \sim p$

Saying that it's ^{نادرست} false that

no man has one name only → هیچ مردی فقط یک اسم ندارد

is equivalent ^{معاادل} to saying that

- ☐ A. all men have only one name
- ☒ B. there exists at least one man with one name only
- ☐ C. there exists a man named Mario
- ☐ D. there exists a man without name
- ☐ E. at least one man has two names

Supposing that the statement

All Italians like soccer or basketball

is false, it follows necessarily that

- ☐ A. all Italians play soccer and basketball
- ☒ B. some Italian does not like soccer and basketball
- ☐ C. all Italians not like soccer or basketball
- ☐ D. there are Italians who like soccer and basketball
- ☐ E. no Italian likes soccer or basketball

Let T be a triangle. Then the negation of the statement

T is a right isosceles triangle

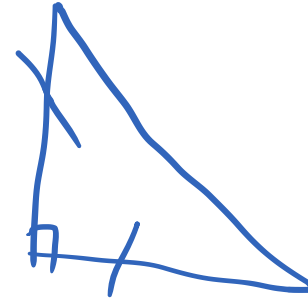
is:

مكعب الزاوية

مساوي الساقين



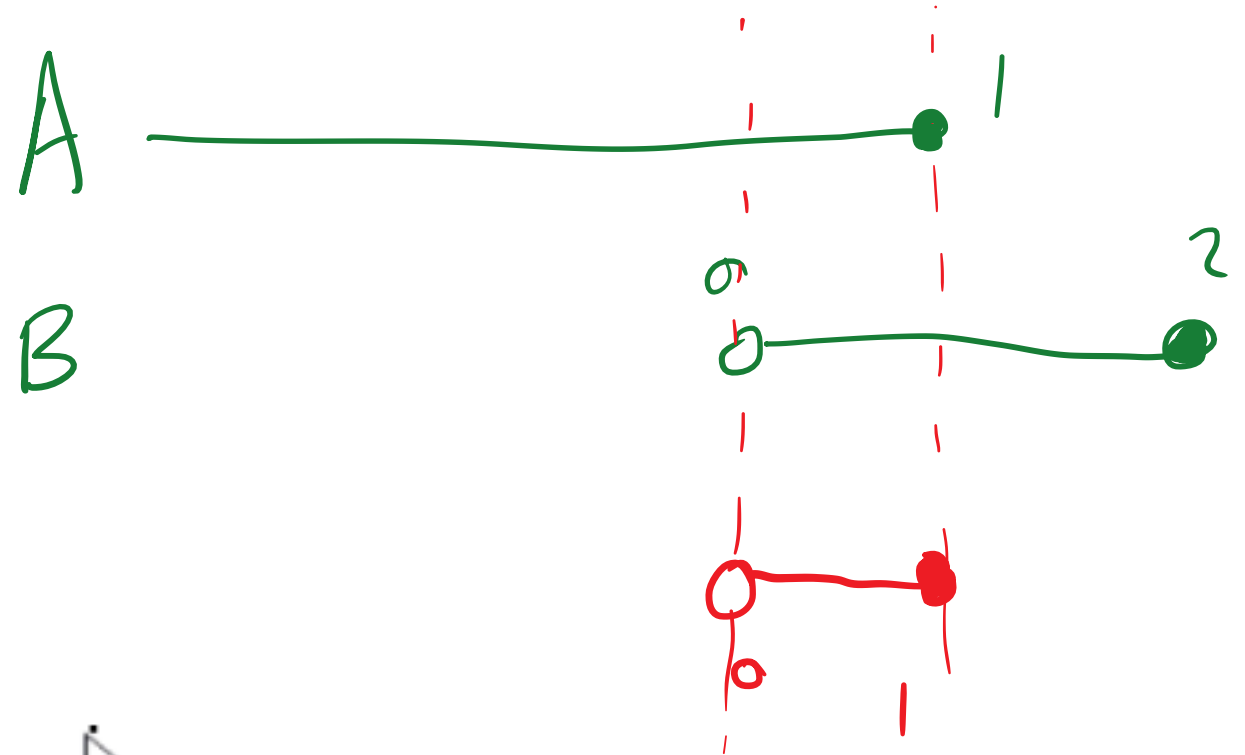
نفي



- ☐ A. T is not a right triangle and it is not isosceles.
- ☐ B. T is isosceles but not a right triangle.
- ☐ C. T is a right triangle but is not isosceles.
- ☒ D. T is not a right triangle or it is not isosceles.
- ☐ E. T is not a triangle.

Let A be the set of real numbers x such that $x \leq 1$ and let B be the set of real numbers x such that $0 < x \leq 2$. Then the set $A \cap B$ consists of the real numbers x such that:

- ☐ A. $x \leq 2$
- ☐ B. $x > 2$
- ☐ C. $1 < x \leq 2$
- ☐ D. $0 < x \leq 1$
- ☐ E. $x \leq 1$



$$A \cap B = (0, 1] \rightarrow \boxed{x \leq 1}$$

A drawer contains $\widehat{8}$ black, $\widehat{5}$ red and $\widehat{4}$ blue pencils. Assuming you remove pencils without looking, what is the minimum number you must take to ensure that you get at least one of each color?

- ☐ A. 12
- ☐ B. 13
- ☐ C. 17
- ☒ D. 14
- ☐ E. 3

$$8 + 5 + 1 = 14$$