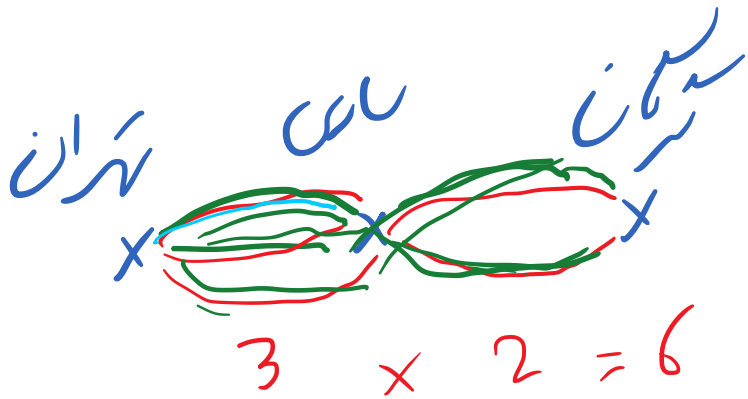اصل ضرب: اگر کار اتفاقی با m حالت مختلف قابل انجام باشد و اتفاق مستقل دیگری با n حالت مختلف قابل انجام باشد، دو اتفاق همزمان با $m \times n$ حالت مختلف قابل انجام هستند.
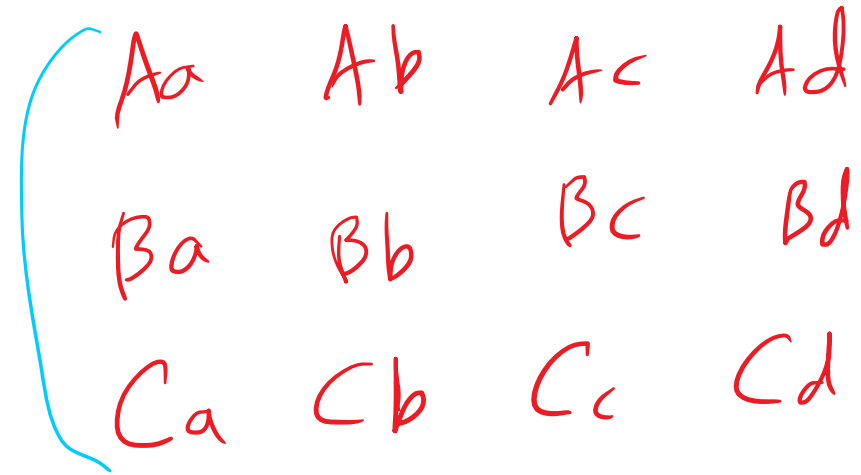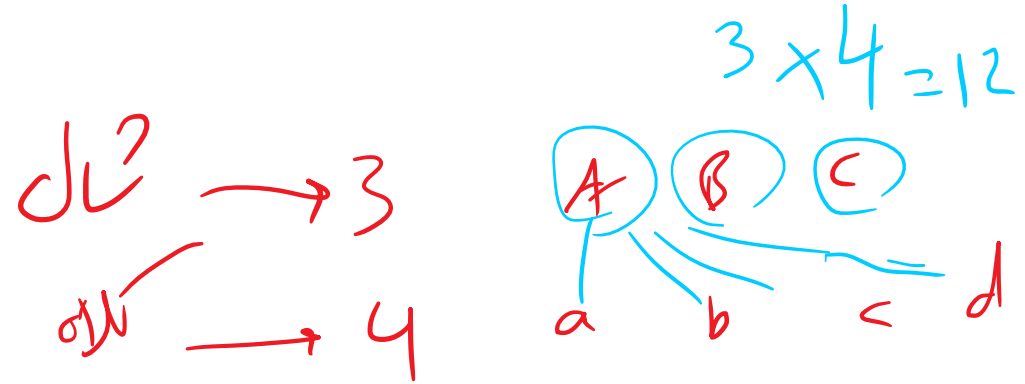
تهران
ساری
سمنان

$3 \times 2 = 6$

رشت — بیرجند — زنجان
سمنان — اصفهان — مشهد — تهران

$2 \times 3 = \boxed{6}$

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

$3 \times 4 = 12$

$scarf^? \rightarrow 3$

$hat \rightarrow 4$

A B C

a b c d

Aa Ab Ac Ad

Ba Bb Bc Bd

Ca Cb Cc Cd

DAAN
ACADEMY

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?

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

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

- Aldo did not finish third.
- Bruno did not finish second.
- Carlo finished before the others.

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

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.

Bruno: The square of an odd integer is odd.

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

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

Eva: What Anna says is false.

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

A. $\{3,6,9,12\}$

B. $\{6,9,12\}$

✓ C. $\{3,5,6,7,9,11,12\}$

D. $\{3,5,7,9,11\}$

E. $\{1,3,5,6,7,9,11,12,13\}$

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

$$\{3, 5, 6, 7, 9, 11, 12\}$$

$if \longrightarrow$

مطرح زمانی درست است که q درست باشد
$P \ if \ q \longrightarrow$
q شرط کافی برای P هست

مطرح زمانی درست بوده که q درست باشد
$P \ only \ if \ q \longrightarrow$
q شرط ملزم برای P هست

$P \ if \ and \ only \ if \ q \longrightarrow$
q شرط ملزم و کافی برای P هست

ممکن q اتفاق بیفته
و P اتفاق بیفته

اگر q اتفاق بیفته
حتما P اتفاق میافته

یعنی ممکنه P اتفاق بیفته
ولی q اتفاق نیفته
(ممکن q و)
q اتفاق بیفته و P اتفاق نیفته

آگر q اتفاق بیفته حتما P اتفاق می افته و اگر q اتفاق نیفته P اتفاق نمیافته

شرط لازم : شرط است که برای به وقوع پیوستن یک رویداد، مشروط، اسے مگر این شرط برقرار نباشد، رویداد اتفاق نیافته

$\downarrow$
necessary

نکته مهم: اگر شرط لازم برقرار باشد، باز هم ممکن است که رویداد اتفاق نیفتد.

شرط کافی: شرط است که اگر برقرار باشد، رویداد حتماً اتفاق می افتد

شرط لکن برای q : $P \rightarrow q$

$\downarrow$
sufficient

نکته مهم: اگر شرط کافی برقرار باشد، باز هم ممکن است رویداد اتفاق بیفتد

شرط لازم و کافی: ترکیب دو شرط بالاست. مثلاً اگر A شرط لازم و کافی برای B باشد، اگر A اتفاق می افتد و اگر B اتفاق بیفتد حتماً A اتفاق می افتد.

$P \longleftrightarrow q$

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

✓ 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

From the statement

Only the even integers can be divisible by 4

one can deduce that

○ 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 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

Saying that it's false that

no man has one name only

is equivalent 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
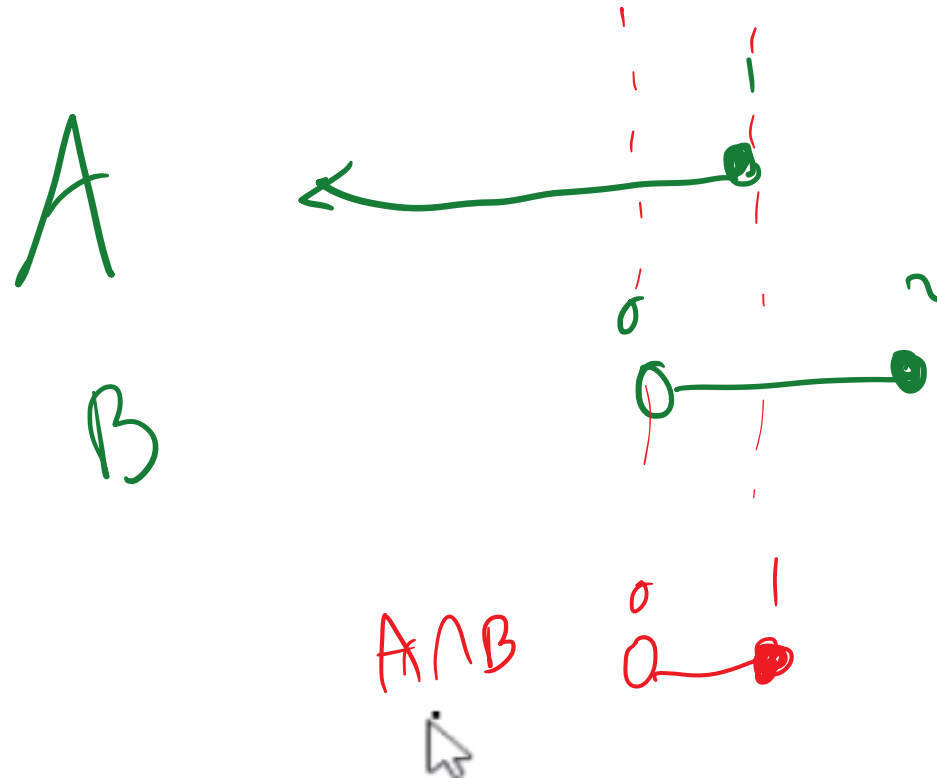
T is a right isosceles triangle

is:

- 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. $x > 2$

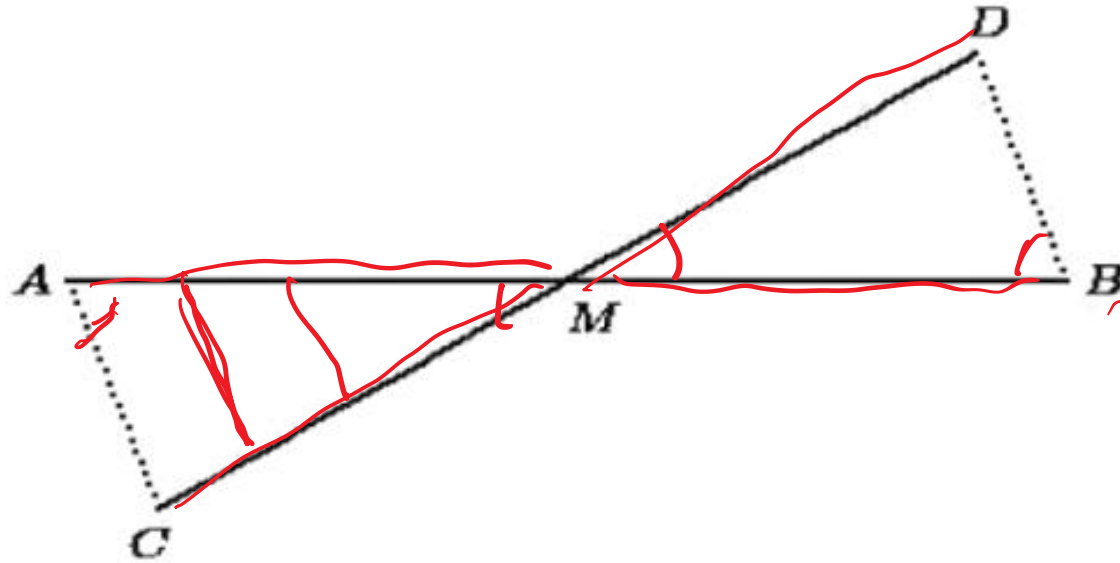C. $1 < x \leq 2$

D. $0 < x \leq 1$

E. $x \leq 1$

A drawer contains 8 black, 5 red and 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?

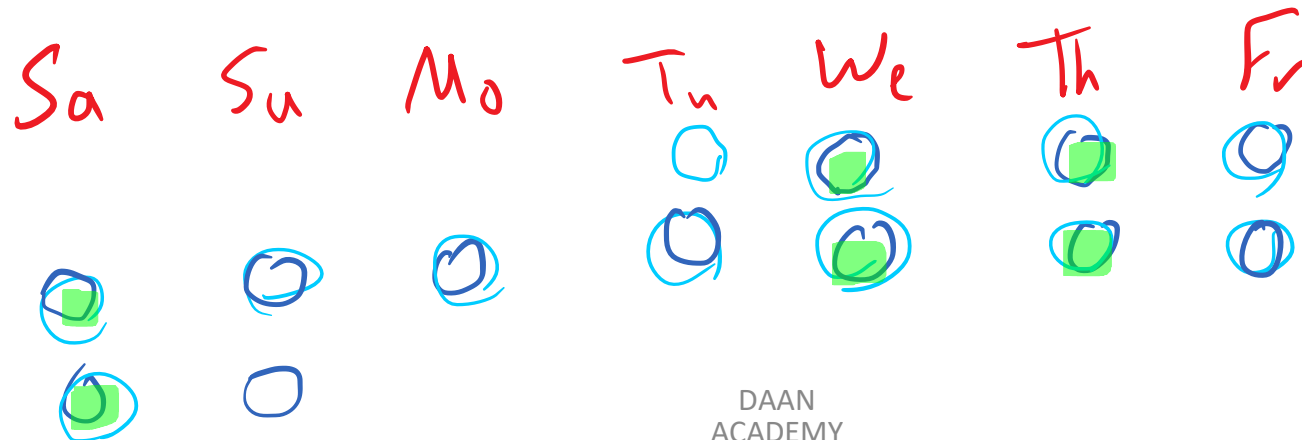A. 12

B. 13

C. 17

D. 14

E. 3

$$8 + 5 + 1 = 14$$

Two coplanar segments $\overline{AB}$ and $\overline{CD}$ meet at point M. In order that the segments $\overline{AC}$ and $\overline{DB}$ be parallel

○ A. it is necessary and sufficient that $\overline{AM} = \overline{CM}$

○ B. it is sufficient that $\overline{AM} = \overline{MB}$

○ C. it is necessary that $\overline{AM} = \overline{MB}$

○ D. it is necessary that $\overline{AM} = \overline{MB}$ and $\overline{CM} = \overline{MD}$

✓ E. it is sufficient that $\overline{AM} = \overline{MB}$ and $\overline{CM} = \overline{MD}$

I will vacation for 12 days (include the arrival day) in a strange place where the sun shines only on Wednesdays, Thursdays and Saturdays. To get the maximum number of sunny days, I must arrive

A. either Wednesday or Thursday

B. Wednesday

C. either Tuesday or Wednesday

D. Saturday

E. either Wednesday, Thursday or Saturday

Let X and Y be two subsets of the real numbers. We know that 3 is the minimum of X and that 5 is the minimum of Y Then necessarily

A. there exist infinitely many elements of X between 3 and 5

B. all the elements of X are less than 5

C. there exists at least one element of X greater than 5

D. all the elements of X are less than any element of Y

E. there exists at least one element of X less than 5

A farmer grows only 5 types of vegetables: oats, corn, barley, peas, and soy. Every year she plants only 3 types of vegetables, according to the following rule:

1. if she plants barley one year, she does not replant it the next

2. every year she plants corn, she also plants oats

3. every year she plants at most one of the vegetables she planted the year before

Which of the following answers shows two possible triplets of vegetables that she can plant in two consecutive years (the earlier year first)?

A. Oats, peas, soy; corn, oats, barley

B. Peas, corn, soy; oats, peas, barley

C. Oats, corn, peas; corn, oats, soy

D. Soy, peas, barley; maize, oats, barley

E. Oats, corn, barley; corn, peas, soy

DAAN
ACADEMY

Naples and Capua are both cities in Campania. If Asdrubale were born in Naples, then he would be a Campanian. However, we discovered that Asdrubale was not born in Naples. With only this information available, which of the following statements can we deduce?

A. We cannot say whether Asdrubale is Campanian or not

B. Asdrubale is Italian

C. Asdrubale is not Campanian

D. Asdrubale is a Campanian

E. Asdrubale was born in Capua

اظهار کردن

Asserting that

Every 24-hour pharmacy must always have at least one pharmacist on duty
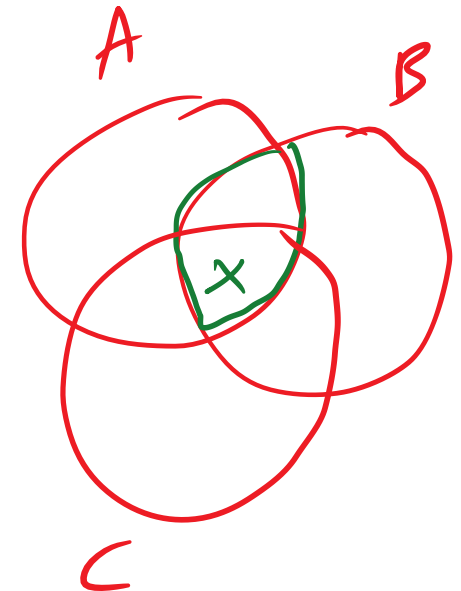
is equivalent to saying that

A. in Liola 's pharmacy the pharmacists go to lunch from noon to 1am

B. there are no 24-hour pharmacies at which there is not always at least one pharmacist on duty

C. in every pharmacy the same pharmacist is on duty 24 hours a day

D. at a 24-hour pharmacy there are never two pharmacists on duty simultaneously

E. there is one 24-hour pharmacy at which there is not always one pharmacist on duty

Let A, B and C be three sets and suppose there is an element belonging to $A \cap B \cap C$. Then it's necessarily true that

منطق ~~~~ عضو

نَاهَاً داخل (به وَنا كَضعُد كَيرِ نكراب)

○ A. $A \cap B$ is strictly contained in $A \cap B \cap C$

○ B. $A \cap B \cap C$ is strictly contained in $A \cap B$

○ C. $A \cup B \cup C$ is contained in $A \cup B$

○ D. there is an element that is in $A \cap B$ but not in C

✓ E. $A \cap B$ is not the empty set

In decimal notation, how many five digit natural numbers (reading from left to right) are such that each digit but the first is the previous incremented by 1?

A. 25

B. 6

C. 120

D. 5 ✓

E. 5^5

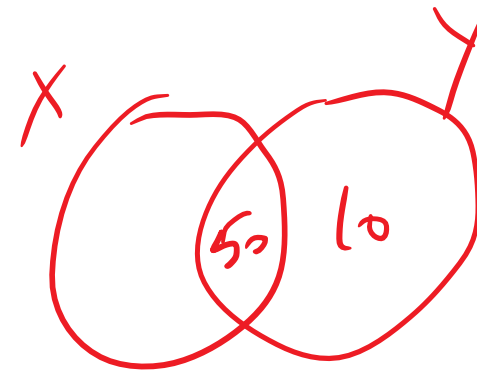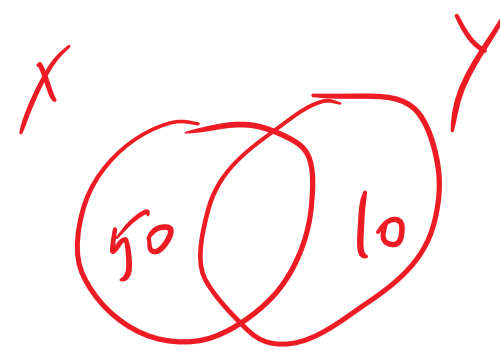1 2 3 4 5

2 3 4 5 6

3 4 5 6 7

4 5 6 7 8

5 6 7 8 9

At the high school 'Toti Benben' in 2001, there was at least one class in which all the students passed their matriculation exam. This did not happen in the high school 'Neri di Jella'. It follows necessarily that, by the end of the 2001 school year,

امکان دہ

A. at the high school "Neri di Jella" there was at least one class in which all the students flunked

B. at the high school "Neri di Jella" nobody passed the matriculation exam in any class

C. at the high school "Toti Benben" at least one person graduated in each class

D. at the high school "Toti Benben" there was at least one class in which all the students flunked

E. at the high school "Neri di Jella" each class had a student who flunked

If X and Y are two sets with X containing 50 elements and $X \cup Y$ containing 60 elements, then the number of elements of Y

A. is 60

B. is 110

C. is more than 60

D. is at least 10 and at most 60

E. is 10

If X and Y are two sets with X containing 50 elements and $X \cap Y$ containing 10 elements, then the number of elements of Y

✓ A. is at least 10

B. is at least 10 and at most 60

C. is 10

D. is 60

E. is greater than 60