**Test 1:**

2. **Given two propositions:**

**p = "I went to Paris."**

**q = "I visit Eiffel Tower"**

**Which sentence on the left corresponds to the expression on the right?**

|  |  |
| --- | --- |
| **I visit Eiffel Tower** only if I go to Paris. | q → p or p → q or p ¬q or ¬p → ¬q |
| I cannot visit Eiffel Tower if I do not go to Paris. | q → p or p → q or p ¬q or ¬p → ¬q |
| Whenever I go to Paris, I visit Eiffel Tower. | q → p or p → q or p ¬q or ¬p → ¬q |
| I went to Paris, but I did not visit Eiffel Tower. | q → p or p → q or p ¬q or ¬p → ¬q |

1. **Let p, q be two propositions. Which propositions are logically equivalent to**[\to q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=p\to%20q)**?**

|  |  |
| --- | --- |
| [neg p\vee q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\neg%20p\vee%20q) | Yes/ No |
| [neg p\vee \neg q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\neg%20p\vee%20\neg%20q) | Yes/ No |
| [\vee q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=p\vee%20q) | Yes/ No |
| [neg p\wedge q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\neg%20p\wedge%20q) | Yes/ No |
|  |  |

1. **Which propositions are contradiction?**

|  |  |
| --- | --- |
| [p\to q)\wedge(q\to p)\wedge(p\oplus q)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=(p\to%20q)\wedge(q\to%20p)\wedge(p\oplus%20q)) | Yes/ No |
| [(p\to q)\vee(q\to p)]\wedge(p\oplus q)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5b(p\to%20q)\vee(q\to%20p)%5d\wedge(p\oplus%20q)) | Yes/ No |
| [p\to q)\vee(q\to p)\vee(p\oplus q)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=(p\to%20q)\vee(q\to%20p)\vee(p\oplus%20q)) | Yes/ No |
|  |  |

1. **Which statements are correct?**

|  |  |
| --- | --- |
| [forall x(P(x) \wedge Q(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x(P(x)%20\wedge%20Q(x)))and [[forall xP(x)\wedge \forall xQ(x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20xP(x)\wedge%20\forall%20xQ(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cforall%20xP%28x%29%5Cwedge%20%5Cforall%20xQ%28x%29" \o "TeX)have the same truth values | T/F |
| [forall x(P(x)\to Q(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x(P(x)\to%20Q(x)))and [[forall xP(x)\to \forall xQ(x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20xP(x)\to%20\forall%20xQ(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cforall%20xP%28x%29%5Cto%20%5Cforall%20xQ%28x%29" \o "TeX)have the same truth values | T/F |
| [forall x(P(x) \vee Q(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x(P(x)%20\vee%20Q(x)))and [[forall xP(x) \vee \forall xQ(x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20xP(x)%20\vee%20\forall%20xQ(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cforall%20xP%28x%29%20%5Cvee%20%5Cforall%20xQ%28x%29" \o "TeX)have the same truth values | T/F |

1. **Translate the logical expression into sentence, domain is all real numbers**

**[forall x\forall y(((x<0)\wedge (y<0))\to (xy>0))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x\forall%20y(((x%3c0)\wedge%20(y%3c0))\to%20(xy%3e0)))**

Select one:

a. The product of two negative numbers is negative

b. For each negative number x there is a negative number y such that xy is positive

c. There is a negative number x and there is a negative number y such that xy is positve

d. The product of two negative numbers is positive

1. **Given the hypotheses:**

* **I work hard or I am smart**
* **I am not smart**
* **If I work hard then I will pass the exam**
* **If I am lucky then I will pass the exam**

**Which statement can be deduced from the above hypotheses?**

Select one:

a. I work hard and I am lucky

b. I work hard and I pass the exam

c. None of the other choices is correct

d. I work hard and I pass the exam and I am lucky

1. **Which pairs of propositions are logically equivalent?**

|  |  |
| --- | --- |
| [forall xP(x,y)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20xP(x,y))và [forall yP(x,y)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20yP(x,y)) | Answer 1Choose...NoYes |
| [exists yP(x,y)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\exists%20yP(x,y)) và [exists xP(x,y)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\exists%20xP(x,y)) | Answer 2Choose...NoYes |
| [forall x\forall yP(x,y)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x\forall%20yP(x,y)) và [forall y\forall xP(x,y)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20y\forall%20xP(x,y)) | Answer 3Choose...NoYes |
| [forall x\exists yP(x,y)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x\exists%20yP(x,y))và [exists x\forall yP(x,y)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\exists%20x\forall%20yP(x,y)) | Answer 4Choose...NoYes |

1. **Let A, B be sets. The statement**

**[ \cup (B \cap \overline{A}) = A \cup B](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%20\cup%20(B%20\cap%20\overline%7bA%7d)%20=%20A%20\cup%20B)**

**is True of False?**

Select one:

True

False

1. **Find the cardinality of the set { a, { a }, { a, { a } } }.**
2. **Compute**

**[lfloor \left( \frac{7}{2}\right)^2 \rfloor - \left( \lfloor \frac{7}{2} \rfloor \right)^2](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\lfloor%20\left(%20\frac%7b7%7d%7b2%7d\right)%5e2%20\rfloor%20-%20\left(%20\lfloor%20\frac%7b7%7d%7b2%7d%20\rfloor%20\right)%5e2)**

**=12 – 9 = 3**

1. **Compute**

**[lfloor \frac{3}{2} - \lceil 3 + \frac{5}{4}\rceil \rfloor](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\lfloor%20\frac%7b3%7d%7b2%7d%20-%20\lceil%203%20+%20\frac%7b5%7d%7b4%7d\rceil%20\rfloor)**

= -4

1. **Let f(X) = 5X + 4, g(X) = 4X + 3. Suppose that f o g (X) = aX + b. Find a + b.**
2. **Compute**

**[lfloor \frac{3}{2} - \lceil 3 + \frac{5}{4}\rceil \rfloor](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\lfloor%20\frac%7b3%7d%7b2%7d%20-%20\lceil%203%20+%20\frac%7b5%7d%7b4%7d\rceil%20\rfloor)**

1. **Let f: Z x Z --> Z, f(m, n) = m+2. Choose correct answer:**

Select one:

a. f(x) is neither one-to-one nor onto

b. f is one-to-one but not onto

c. f is onto but not one-to-one

d. f is a bijection

1. **Compute**

**[displaystyle \sum_{j=0}^3\sum_{i=0}^2 (i+j)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\displaystyle%20\sum_%7bj=0%7d%5e3\sum_%7bi=0%7d%5e2%20(i+j))**

Select one:

a. 24

b. 18

c. Lựa chọn khác

d. 20

e. 30

Test 1.

### Question 1

**How many tuples (p, q, r, s) that make the following proposition False?**

**[\neg p \vee q \vee \neg r \vee s) \wedge](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=(\neg%20p%20\vee%20q%20\vee%20\neg%20r%20\vee%20s)%20\wedge%20(p%20\vee%20\neg%20q%20\vee%20\neg%20r%20\vee%20s))**

### Question 2

**Given two propositions:**

**p = "I went to Paris."**

**q = "I visit Eiffel Tower"**

**Which sentence on the left corresponds to the expression on the right?**

|  |  |
| --- | --- |
| I cannot visit Eiffel Tower if I do not go to Paris. | ¬p → ¬q p → q q → p p ^ ¬q |
| I went to Paris, but I did not visit Eiffel Tower. | ¬p → ¬q p → q q → p p ^ ¬q |
| I visit Eiffel Tower only if I go to Paris. | ¬p → ¬q p → q q → p p ^ ¬q |
| Whenever I go to Paris, I visit Eiffel Tower. | ¬p → ¬q p → q q → p p ^ ¬q |
|  |  |
|  |  |

#### Feedback

The correct answer is:

I cannot visit Eiffel Tower if I do not go to Paris. → ¬p → ¬q,

I went to Paris, but I did not visit Eiffel Tower. → p ^ ¬q,

I visit Eiffel Tower only if I go to Paris. → q → p,

Whenever I go to Paris, I visit Eiffel Tower. → p → q

### Question 3

**Which propositions are contradiction?**

|  |  |
| --- | --- |
| [(p\to q)\vee(q\to p)]\wedge(p\oplus q)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5b(p\to%20q)\vee(q\to%20p)%5d\wedge(p\oplus%20q)) | No/Yes |
| [p\to q)\vee(q\to p)\vee(p\oplus q)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=(p\to%20q)\vee(q\to%20p)\vee(p\oplus%20q)) | No/Yes |
| [p\to q)\wedge(q\to p)\wedge(p\oplus q)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=(p\to%20q)\wedge(q\to%20p)\wedge(p\oplus%20q)) | No/Yes |
|  |  |

#### Feedback

The correct answer is:

[(p\to q)\vee(q\to p)]\wedge(p\oplus q)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5b(p\to%20q)\vee(q\to%20p)%5d\wedge(p\oplus%20q)) → No,

[p\to q)\vee(q\to p)\vee(p\oplus q)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=(p\to%20q)\vee(q\to%20p)\vee(p\oplus%20q)) → No, 

### Question 4

**Which propositions are logically equivalent to****[[\leftrightarrow q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=p\leftrightarrow%20q)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=p%5Cleftrightarrow%20q" \o "TeX)?**

|  |  |
| --- | --- |
| [neg q\leftrightarrow \neg p](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\neg%20q\leftrightarrow%20\neg%20p) | No/Yes |
| [neg p\leftrightarrow q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\neg%20p\leftrightarrow%20q) | No/Yes |
| [\leftrightarrow\neg q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=p\leftrightarrow\neg%20q) | No/Yes |
| [neg p\leftrightarrow \neg q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\neg%20p\leftrightarrow%20\neg%20q) | No/Yes |

|  |  |
| --- | --- |
|  |  |

#### Feedback

The correct answer is:

[neg q\leftrightarrow \neg p](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\neg%20q\leftrightarrow%20\neg%20p) → Yes,

[neg p\leftrightarrow q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\neg%20p\leftrightarrow%20q) → No, 

[\leftrightarrow\neg q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=p\leftrightarrow\neg%20q) → No, 

[neg p\leftrightarrow \neg q](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\neg%20p\leftrightarrow%20\neg%20q) → Yes

### Question 5

**Which statements are correct? (p.45)**

|  |  |
| --- | --- |
| [forall x(P(x)\to Q(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x(P(x)\to%20Q(x)))and [[forall xP(x)\to \forall xQ(x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20xP(x)\to%20\forall%20xQ(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cforall%20xP%28x%29%5Cto%20%5Cforall%20xQ%28x%29" \o "TeX)have the same truth values | F/T |
| [forall x(P(x) \vee Q(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x(P(x)%20\vee%20Q(x)))and [[forall xP(x) \vee \forall xQ(x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20xP(x)%20\vee%20\forall%20xQ(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cforall%20xP%28x%29%20%5Cvee%20%5Cforall%20xQ%28x%29" \o "TeX)have the same truth values | F/T |
| [forall x(P(x) \wedge Q(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x(P(x)%20\wedge%20Q(x)))and [[forall xP(x)\wedge \forall xQ(x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20xP(x)\wedge%20\forall%20xQ(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cforall%20xP%28x%29%5Cwedge%20%5Cforall%20xQ%28x%29" \o "TeX)have the same truth values | F/T |
|  |  |

#### Feedback

The correct answer is:

[forall x(P(x)\to Q(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x(P(x)\to%20Q(x)))and [[forall xP(x)\to \forall xQ(x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20xP(x)\to%20\forall%20xQ(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cforall%20xP%28x%29%5Cto%20%5Cforall%20xQ%28x%29" \o "TeX)have the same truth values → F,

[forall x(P(x) \vee Q(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x(P(x)%20\vee%20Q(x)))and [[forall xP(x) \vee \forall xQ(x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20xP(x)%20\vee%20\forall%20xQ(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cforall%20xP%28x%29%20%5Cvee%20%5Cforall%20xQ%28x%29" \o "TeX)have the same truth values → F, 

[forall x(P(x) \wedge Q(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20x(P(x)%20\wedge%20Q(x)))and [[forall xP(x)\wedge \forall xQ(x)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20xP(x)\wedge%20\forall%20xQ(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=%5Cforall%20xP%28x%29%5Cwedge%20%5Cforall%20xQ%28x%29" \o "TeX)have the same truth values → T

### Question 6

**Let  
  
P(x) = "x goes to class regularly"  
  
Q(x) = "x reads books"  
  
R(x) = "x passed the exam"  
  
Translate the sentence into logical expression, domain is the set of all students in class.  
  
"Some student who goes to class regularly and reads books has failed the exam"**

Select one:

1. [exists x((P(x)\vee Q(x))\to \neg R(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\exists%20x((P(x)\vee%20Q(x))\to%20\neg%20R(x)))
2. None of the other choices is correct
3. [exists x(P(x)\wedge Q(x)\wedge \neg R(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\exists%20x(P(x)\wedge%20Q(x)\wedge%20\neg%20R(x)))
4. [exists x(P(x)\vee Q(x)\vee \neg R(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\exists%20x(P(x)\vee%20Q(x)\vee%20\neg%20R(x)))
5. [exists x((P(x)\wedge Q(x)) \to neg R(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\exists%20x((P(x)\wedge%20Q(x))%20\to%20neg%20R(x)))

#### Feedback

The correct answer is: [exists x(P(x)\wedge Q(x)\wedge \neg R(x))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\exists%20x(P(x)\wedge%20Q(x)\wedge%20\neg%20R(x)))

### Question 7

**Given an argument:  
  
*"If Jack is a soccer player then Jack is rich.***

***Jack only plays pingpong.***

***Therefore Jack is not rich."*  
  
Choose correct statement:**

Select one: (P.72)

a. This valid argument is based on modus tollens

b. This valid argument is based on disjunctive syllogism

c. This valid argument is based on hypothetical syllogism

d. This valid argument is based on modus ponens

e. This argument is a fallacy (P.75)

#### Feedback

The correct answer is: This argument is a fallacy

### Question 8

**Find the negation of (P. 46,47)**

**[exists y(Q(x,y)\wedge \forall x\neg R(x,y))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\exists%20y(Q(x,y)\wedge%20\forall%20x\neg%20R(x,y)))**

Select one:

a. [forall y(\neg Q(x,y)\wedge\exists xR(x,y))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20y(\neg%20Q(x,y)\wedge\exists%20xR(x,y))).

b. [forall y(\neg Q(x,y)\vee \exists x\neg R(x,y))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20y(\neg%20Q(x,y)\vee%20\exists%20x\neg%20R(x,y))).

c. [forall y(\neg Q(x,y)\vee\forall xR(x,y))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20y(\neg%20Q(x,y)\vee\forall%20xR(x,y))).

d. [forall y(\neg Q(x,y)\vee \exists xR(x,y))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20y(\neg%20Q(x,y)\vee%20\exists%20xR(x,y))).

#### Feedback

The correct answer is: [forall y(\neg Q(x,y)\vee \exists xR(x,y))](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\forall%20y(\neg%20Q(x,y)\vee%20\exists%20xR(x,y))).

### Question 9

**Let A ={1, 2, 4, 6, 7, 9, 8} B = {3, 1, 5, 7, 6}. Which set has the maximum cardinality?**

Select one:

a. [-A](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=B-A) ={3,5}

b. [ \cap B](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A%20\cap%20B)={1,6,7}

c. [-B](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A-B)={2,4,9,8}

#### Feedback

The correct answer is: [-B](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=A-B)

### Question 10

**Let A={0, a}, B={0, b}. Determine B x A. (P. 123)**

Select one:

a. {(0,0), (a, b)}

b. {(0,0), (0, b), (a, 0), (a, b)}

c. {(0,0), (0, b), (a, 0), (a, b), (b, a), (0, a), (b, 0)}

d. {(0,0), (b, a), (0, a), (b, 0)}

#### Feedback

The correct answer is: {(0,0), (b, a), (0, a), (b, 0)}

### Question 11

**Let f(X) = 5X + 4, g(X) = 4X + 3. Suppose that gof (X) = aX + b. Find b.**

Answer:

#### Feedback

The correct answer is: 19

### Question 12

**Let f(X) = 5X + 4, g(X) = 4X + 3. Suppose that f o g (X) = aX + b. Find a + b.**

Answer:

#### Feedback

The correct answer is: 39

### Question 13

**Compute****[lfloor \frac{3}{2} - \lceil 3 + \frac{5}{4}\rceil \rfloor](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\lfloor%20\frac%7b3%7d%7b2%7d%20-%20\lceil%203%20+%20\frac%7b5%7d%7b4%7d\rceil%20\rfloor)**

Answer:

#### Feedback

The correct answer is: -4

### Question 14

**Let f: Z x Z --> Z, f(m, n) = n+1. Choose correct answer:**

Select one:

a. f(x) is neither one-to-one nor onto

b. f is onto but not one-to-one

c. f is a bijection

d. f is one-to-one but not onto

#### Feedback

The correct answer is: f is onto but not one-to-one

### Question 15

**Compute****[displaystyle\sum_{j=0}^3\sum_{i=1}^2 (i+2j)](https://cmshn.fpt.edu.vn/filter/tex/displaytex.php?texexp=\displaystyle\sum_%7bj=0%7d%5e3\sum_%7bi=1%7d%5e2%20(i+2j))**

Select one:

a. 24

b. 38

c. 40

d. 36

e. Lựa chọn khác