

# Progress Test 1 (Logic, Set, Function, Sequence)

Total points 35/35 ?

You have 45 minutes to answer 28 questions (35 points) in the form.

First, fill some information about you.

NO CHEATING AS THE QUESTIONS AND THE OPTIONS WERE SHUFFLED.

Good luck!

The respondent's email address (**quanglnnde150066@fpt.edu.vn**) was recorded on submission of this form.

0 of 0 points

Full name \*

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Class \*

SE150 [2]

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The Foundations: Logic and Proofs

16 of 16 points



13 questions - 16 points (/ 28 questions - 35 points)

✓ Determine whether the proposition is a tautology? \*

1/1

- ☐  $P \wedge \text{True}$
- ☒  $P \vee \neg P$
- ☐  $P \vee \text{False}$



✓ Let  $A(x)$  denote the statement "Computer  $x$  is under attack by an intruder." Suppose that of the computers on campus, only MATH1 is currently under attack by intruders. What are truth values of  $A(\text{CS1})$ , and  $A(\text{MATH1})$ ? \*

1/1

- ☐  $A(\text{CS1})$  is true and  $A(\text{MATH1})$  is false.
- ☐  $A(\text{CS1})$  is false and  $A(\text{MATH1})$  is false.
- ☒  $A(\text{CS1})$  is false and  $A(\text{MATH1})$  is true.
- ☐  $A(\text{CS1})$  is true and  $A(\text{MATH1})$  is true.



✓ Which of the following statement is/are (a) proposition(s)? \*

2/2

- ☒ Ha Noi is not the capital of Vietnam.
- ☐  $X+Y=Z$ .
- ☐ What time is it?
- ☒ I am a girl.



1 + 5 = 1

 11/3/2020

☐ Help me!

✓ Determine whether the logically equivalence is distribute (phân phối) law? \* 1/1

☒  $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$



☐  $p \vee (p \wedge q) \equiv p$

☐  $p \wedge (p \vee q) \equiv p$

✓ Determine whether the logically equivalence is distribute (phân phối) law? \* 1/1

☐  $\neg (p \wedge q) \equiv \neg p \vee \neg q$

☐  $\neg (p \vee q) \equiv \neg p \wedge \neg q$

☒  $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$



✓ Let us call  $P = \text{"I am a student in FUDN"}$ ,  $Q = \text{"I have a good job"}$ . Thus,  $P \rightarrow Q$  means \_\_\_\_ \* 1/1

☐ The necessary for me to have a good job is that I am a student at FUDN.

☒ I am a student at FUDN, only if I have a good job.



☐ If I am not a student at FUDN, I do not have a good job.



✓ Determine whether the argument given here is valid \*

1/1

☐

"If you do every exercise in this book, then you will pass the course discrete mathematic. We know that you passed the course. Hence, you did all exercise in this book."

☒

"If the prime interest rate goes up then the stock prices go down. If the stock prices go down then most people are unhappy. Consequently, if the prime interest rate goes up then most people are unhappy."

✓

☒

"If you send me an e-mail message, then I will finish writing the program. If you do not send me an e-mail message, then I will go to sleep early. If I go to sleep early, then I will wake up feeling refreshed. Therefore, if I do not finish writing the program, then I will wake up feeling refreshed."

✓

✓ Let us call  $P = \text{"I am a student in FUDN"}$ ,  $Q = \text{"I have a good job"}$ . Thus,  $P \rightarrow Q$  means \_\_\_\_ \*

2/2

☒

The sufficient for me to have a good job is that I am a student at FUDN.

✓

☐

If I have a good job, then I am a student at FUDN.

☒

If I do not have a good job, I am not a student at FUDN.

✓

✓ Let  $P(x)$  and  $Q(x)$  be two statements of " $x$  is a prime number.", " $x$  is odd". The domain consists of all positive integers. Let  $R$  and  $S$  be the quantifications of " $\forall x [P(x) \rightarrow Q(x)]$ " and " $\exists x [P(x) \wedge \neg Q(x)]$ ", respectively. What are the truth values of  $R$  and  $S$ ? \*

1/1

☐

$R$  is true and  $S$  is true

☐

$R$  is false and  $S$  is false



☒ R is false and S is true



☐ R is true and S is false

✓ Which of the following obtain(s) counter example(s) for seeing that  $(p \rightarrow q)$  is not logically equivalence to  $(\neg p \rightarrow \neg q)$ ? \*

☒ p is false and q is true



☐ p is true and q is true

☐ p is false and q is false

☒ p is true and q is false



✓ Determine whether the proposition is a tautology? \*

1/1

☒  $P \vee \text{True}$



☐  $P \vee P$

☐  $P \wedge P$

✓ Determine whether the argument given here is valid \*

1/1

☒ "If Thoong is good at learning he will get a prize. Assume that he did not get a prize. Therefore, he is not good at learning."



☐ "If CôVy works hard then she will pass the examination. We know that she did not work hard. Consequently, Cô-Vy will not pass the examination."



✓ All student are in this class had taken the course MAD101. Bon is in this class. Had Bon taken PFC? \*

1/1

- ☐ No
- ☒ Yes



## Basic Structures: Sets, Functions, Sequences and Sums

19 of 19 points

15 questions - 19 points (/ 28 questions - 35 points)

✓ Which of the following is true, where  $\sim$  means the complement (phần bù)? \* 1/1

- ☒  $A \cup (A \cap B) = A$
- ☐  $\sim(A \cap B) = \sim A \cap \sim B$
- ☐  $A \cap (B \cup C) = (A \cup B) \cap (A \cap C)$



✓ Which is the sum of the sequence  $\{5.1, 5.8, 5.27, 5.64, 5.125, 5.216\}$ ? \* 1/1

- ☐ 441
- ☐ 455
- ☒ 2205
- ☐ 91



✓ Let " $\sim$ ", OR and AND be the bit operators of flip bit (0 to 1 and vice versa), 1/1 or bit, and bit. We know that, A is "1011", B is "1110" and C is "1010". Choose the true proposition in the following? \*

- ☐  $C = A \text{ OR } B$
- ☐  $C = \sim B$



☒  $C = A \text{ AND } B$



☐  $C = \sim A$

✓ Which is the sum of the sequence  $\{4^2, 5^2, 6^2, \dots, 20^2\}$ , where  $^$  means  $1/1$  the power by two times. \*

☐ 196

☐ 44100

☒ 2856



☐ 2870

✓ Give the universe  $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ ,  $A = \{1, 2, 3, 4, 5\}$  and  $B = \{4, 5, 6, 7, 8\}$ . Now, we set  $X = \sim(A \cup B)$  and  $Y = (\sim A \cap \sim B)$ , where  $\sim$  means the complement (phần bù). Show X and Y, respectively. \*

☐  $X = \emptyset, Y = \{9, 10\}$

☐  $X = \{9, 10\}, Y = \emptyset$

☒  $X = \{9, 10\}, Y = \{9, 10\}$



☐  $X = \{9, 10\}, Y = \{4, 5\}$

✓ "Suppose that a person deposits \$10K in a savings account at a bank yielding 11% per year with interest compounded annually. The account after 30 years is  $(1,11)^{30} \cdot 10K!$ " Determine whether that argument is valid. \*

1/1

☒ Valid



☐ Invalid



✓ Which of the following (where ^ means the power) is/are (a) fact(s). \* 2/2

☒  $1^2 + 2^2 + 3^2 + \dots + n^2 = [n \cdot (n+1) \cdot (2n+1)] / 6$  ✓

☒  $1 + 2 + 3 + \dots + n = [n \cdot (n+1)] / 2$  ✓

☒  $1^3 + 2^3 + 3^3 + \dots + n^3 = [n^2 \cdot (n+1)^2] / 4$  ✓

✓ Which of the following is/are true? \* 2/2

☒ Fibonacci sequence is  $\{1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, \dots\}$  ✓

☒ The first seven terms of sequence  $\{n!, n=1, 2, \dots\}$  are 1, 2, 6, 24, 120, 720, 5040. ✓

✓ Let the rules of  $r: \mathbb{N} \rightarrow \mathbb{Z}$ ,  $r(n) = \pm n$ ;  $f: \mathbb{N} \rightarrow \mathbb{N}$ ,  $f(n) = n \bmod 3$ ;  $g: \mathbb{R} \rightarrow \mathbb{N}$ ,  $g(x) = \text{floor}(n)$ ; and  $h: \mathbb{Z} \rightarrow \mathbb{Z}$ ,  $h(z) = z+1$ . Which of the following is/are true? \* 1/1

☐ f, g, h and r are not functions

☒ r is not a function/mapping ✓

✓ Let the rules of  $f: \mathbb{N} \rightarrow \mathbb{N}$ ,  $f(n) = n \bmod 3$ ;  $g: \mathbb{R} \rightarrow \mathbb{N}$ ,  $g(x) = \text{floor}(n)$ ; and  $h: \mathbb{Z} \rightarrow \mathbb{Z}$ ,  $h(z) = z+1$ . Which of the following is/are true? \* 2/2

☒ h is bijective (song ánh) ✓

☐ f is injective (đơn ánh), g is injective



☒  $f$  is onto (toán ánh),  $g$  is onto



✓ Which of the following (where  $^$  means the power) is/are (a) fact(s). \* 2/2

☒  $2^0 + 2^1 + 2^2 + \dots + 2^n = 2^{(n+1)} - 1$



☒  $a + a.r + a.r^2 + \dots + a.r^n = [a.r^{(n+1)} - a] / (r-1)$ , for  $r$  is not 1



✓ Let  $N$  be the set of all positive integers. Which of the following is true for  $N$ ? \* 1/1

☐ Countable and Finite

☒ Countable and Infinite



☐ Uncountable and Finite

☐ Uncountable and Infinite

✓ Which of the following is true, where  $\sim$  means the complement (phần bù)? \* 1/1

☒  $C \cup [A \cap (B \cap \sim A)] = C$



☐  $A \cup \sim A = \emptyset$

✓ What is the Cartesian product of  $A = \{1, 2\}$  and  $B = \{a, b, c\}$ ? \* 1/1

☐ 6



☐  $\{(a, 1), (a, 2), (b, 1), (b, 2), (c, 1), (c, 2)\}$

☒  $\{(1, a), (1, b), (1, c), (2, a), (2, b), (2, c)\}$



✓ Given that  $X = \{x \in \mathbb{N} \mid 0 \leq x \leq 6 \text{ and } x \text{ is odd}\}$ . Show the power set  $P(X)$  - 1/1  
the set of all subsets of  $X$ . \*

☐  $\{\{1\}, \{5\}, \{3\}, \{1, 5\}, \{1, 3\}, \{5, 3\}\}$

☒  $\{\emptyset, \{1\}, \{5\}, \{3\}, \{1, 5\}, \{1, 3\}, \{5, 3\}, \{1, 5, 3\}\}$



☐  $\{\{1\}, \{5\}, \{3\}, \{1, 5\}, \{1, 3\}, \{5, 3\}, \{1, 5, 3\}\}$

☐  $\{1, 3, 5\}$

☐  $\{\emptyset, \{1\}, \{5\}, \{3\}, \{1, 5\}, \{1, 3\}, \{5, 3\}\}$

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