Introduction to discrete math, Sets, propositions, logic, proof, project

Discrete math deals with discrete mathematical objects such as integers: - 2, -1, 0, 1, 2, etc.

Discrete math is often used in computer science, information technology, technical informatics, telematics, etc.

en.wikipedia.org/wiki/Discrete\_mathematics

Question:

What is discrete math?

Question:

What do you want from this course of discrete math?

Question:

Your project can be about any topic in discrete math, which you like or interested in. You may present your project to the audience.

Scholarship

Exchange students

American citizenship

Accessing all information you need

Quantum computer

Use quantum computer.

quantum-computing.ibm.com

Question:

Solve number puzzle for 3 + m8 digits.

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/codesums0-9.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code1-9sums.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/1-8code1-8sums.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/0-6codesums.txt

https://discrete4math.weebly.com/uploads/2/5/3/9/25393482/1dx4de5dnumberpuzzle.txt

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Sets

A set is a collection of objects (numbers, countries, etc.), they are unique (no repetition) and unordered (order does NOT matter).

Since order does NOT matter, the total number of subsets of a set is sum of all the combinations, which means 2T, where T is the number of elements (cardinality) of the set.

T = s mod 100

s is your student number.

Question:

How many subsets are there in a set of T elements?

Logic

Boolean logic

Fuzzy logic

Quantum logic

Here we, mostly, use Boolean logic of 0 and 1 only.

Proposition is statement is either true or false.

|  |  |  |  |
| --- | --- | --- | --- |
| P | NOT P | $$P+\left(-1\right)^{P}$$ | NOT NOT P |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | P AND Q | PQ | (P OR Q) AND (P OR NOT Q) AND (NOT P OR Q) |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| P | Q | P OR Q | P + Q - PQ |
| 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| H | R | if H then R | NOT H OR R |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 |

Truth table shows when statement is true or false.

Give truth table for

m4 = 0: NOT

m4 = 1: AND

m4 = 2: OR

m4 = 3: implication

The order of priorities of logical operation is: NOT, AND, OR.

P OR Q AND H AND NOT R

Question:

Order the logical operations OR, AND, NOT.

Question:

Explain NOT, AND, OR gates, using transistors.

Proof

It is impossible to prove perfectly. Many people use this fact to their benefit.

There are different kinds of proof.

Question:

Prove by induction.

Prove $\sum\_{i=0}^{T}b^{i}=\frac{1-b^{T+1}}{1-b}$.

Relation

Relation establishes links between elements of sets.

Function is relation, which reflects all elements of the rage into different elements of domain.

Question:

Is this function (0, 0), (1, 1), (4, 2), (9, 3), (4, -2)? Why?

Question:

Binary relation R on the set {1 to e+2} is defined so that *a*R*b* holds if and only if *a* divides *b*, with remainder. Find the matrix and draw the graph.

Is it reflexive, symmetric, anti-symmetric, transitive, composite?