1 group task in discrete math:

Edited at 10am 27.3.2017.

1. Express the cardinality of the Cartesian product through the cardinalities of the original sets.

2. Define predicate and quantifier.

https://en.wikipedia.org/wiki/Predicate\_(mathematical\_logic)

https://en.wikipedia.org/wiki/Quantifier\_(logic)

3. Give converse, inverse and contrapositive to the statement: if I study hard then I am rich.

4. Find the truth tables.

a. A or not B and C

b. C and not B or not (A or D)

5. Give and explain De Morgan’s laws. Why are they used?

https://en.wikipedia.org/wiki/De\_Morgan%27s\_laws

6. Explain proposition, tautology, contradiction, contingency, syllogisms.

https://en.wikipedia.org/wiki/Syllogism

Proofs:

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/3proofs.ppt

7. Prove the Triangular Number expression $\sum\_{c=0}^{j}c= \frac{j(j+1)}{2}$, *j* is any natural number.

8. Prove that $\sqrt{2}$ is irrational number.

9. Prove the expressions for the sums of the terms of arithmetic and geometric progressions.

10. Prove by contradiction:

“IF 3n + 2 is odd, then n is odd”

11. Prove by contraposition:

“IF 3n + 2 is odd, then n is odd”

Relations:

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/5relations.ppt

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/9relations.ppt

12. Explain relations.

13. Define relations. Give examples of the matrices.

14. A = {1, 2, 3, 4}

Which pairs are belong to R = {(a, b) | a ≤ b} ?

{(1, 1), (1, 2), (1, 3), (1, 4), (2, 3), (2, 4), (3, 4), (2,2), (3,3),(4,4)}

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

15. Binary relation R on the set {1, 2, 3, 4} 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?

16. Binary relation R on the set {1, 2, 3, 4} is defined so that *a*R*b* holds if and only if

*a* divides *b*, with NO remainder. Find the matrix and draw the graph.

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

17. Find f(f(f(f(f(2))))) if f(x) = x2.

18. Solve Fibonacci recurring relation. 1, 1, 2, 3, 5, 8, . . .

19. The deer population is 350 at time n = 0, and 400 at time n = 1. The increase from time n-1 to time n is four times larger than the increase from time n-2 to time n-1. Find the recurrence relation at time n.

20. There are 23 cats in a village this year. The growth of the population of the cats is 7% per year. How many cats will there be in the village in 9 years from now?

Deadline: 31.3.2017 Friday.