1. Which of the following prepositions are logically equivalent to p?
2. p ⊕ p
3. p Λ p

(iii)p ∨ p

1. (ii) and (iii)
2. Only (i)
3. (i) and (iii)
4. (i) and (ii)
5. Only (ii)
6. Which expression gives the result as 10000?
7. 01011 Λ 11011
8. 01011 ⊕ 11011
9. 01011 ∨ 11011
10. 01011 Λ ¬ 11011
11. None of the other choices is correct
12. Which of the following statements are true?
13. (p ⊕ ¬p) ⊕ T ≡ T
14. (p ⊕ ¬p) ⊕ F ≡ T
15. None of the other choices is correct
16. Only (i)
17. Only (ii)
18. (i) and (ii)
19. Let a1, a2,… be the sequence: 0,1,1,0,0,0,1,1,1,1…

Find a90 and a100

1. 1 and 0
2. 0 and 0
3. 0 and 1
4. 1 and 1
5. Given the premises:
6. I will either play badminton or I will get sick
7. I am not sick
8. If I play badminton then I will win the price
9. If I win the price then I will buy a car

Which conclusion can NOT be drawn?

1. I won the price
2. I played badminton
3. I will not buy a motor-cycle
4. If I play badminton then I will buy a car
5. None of the other choices is correct
6. Let {an, n = 1, 2, …} be the sequence

1, 10, 11, 100, 101, 110, 111…

Find a30

1. 1 1110
2. 0 1111
3. 1 1010
4. 1 1111
5. Let

P(x) = “x is divisible by 2”

Q(x) = “x is divisible by 3”

R(x) = “x is divisible by 6”

With the domain be the set of integers, translate the following sentence into logical expressions: “*If an integer is divisible by 6 then it is divisible by both 2 and 3*”.

1. ∃x((P(x) Λ Q(x)) 🡪 R(x))
2. ∀x(R(x) 🡪 (P(x) Λ Q(x)))
3. ∀x(R(x) ⇔ (P(x) Λ Q(x)))
4. ∃x(R(x) 🡪 (P(x) Λ Q(x)))
5. Let U = {0,1,2,3,4,5,6,7,8,9}. Let A, B be subsets of U. The bit string representation of A is 1010101010, and the bit string representation of B is 0101010101. Find the intersection of A and B.
6. The empty set
7. {0,3}
8. {2,4,7}
9. U
10. {0,1,4,6,9}
11. Let: C(x) = “x has a cat”

D(x) = “x has a dog”

F(x) = “x has a ferret”

Express the sentence:

*“For each of the three animals, cats, dogs, and ferrets, there is a student in your class who has this animal as a pet”.*

in terms of C(x), D(x), F(x), quantifiers and logical connectives.

1. ∃x C(x) ∨ D(x) ∨ F(x)
2. ∃x ¬C(x) Λ ¬D(x) Λ ¬F(x)
3. ∀x C(x) Λ D(x) Λ F(x)
4. ∀x ¬C(x) Λ ¬D(x) Λ ¬F(x)
5. Consider the function from Z x Z 🡪 Z given by:

f(m,n) = m + 2n

g(m,n) = 2m + 2n + 1

h(m,n) = m – n

Which functions are onto?

1. f and h
2. only f
3. only g
4. None of the other choices is correct
5. g and h
6. Let L(x,y) be the statement “sin(x + y) = 1”

Translate the statement into logical expression: “*For any x, there are more than one y so that sin(x+y) = 1”*

1. None of the other choices is correct
2. ∃x(∀yL(x,y))
3. ∀x(∃yL(x,y) Λ ∃y’((y’ ≠ y) Λ L(x,y’))
4. ∀x(∃yL(x,y) Λ ∀y’((y’ ≠ y) 🡪 ¬L(x,y))
5. ∀x(∃yL(x,y) Λ ∃y’((y’ ≠ y) Λ L(y,y’))
6. Which rules are functions?
7. f: Z 🡪 R, f(x) = 1/(x2 – 4)
8. f: Z 🡪 R, f(x) = 1/(x2 – 5)
9. f: Z 🡪 Z, f(x) = 1/(x2 – 4)
10. f: Z 🡪 Z, f(x) = 1/(x2 – 5)
11. Find the terms a0, a1, a2, a3, and a4 of the sequence {an}, where:

an = ⌊2n/3⌋ + ⌈2n/3⌉

1. 0,1,2,3,4
2. 0,1,2,4,5
3. 0,2,3,4,5
4. 0,1,3,4,5
5. None of the other choices is correct
6. Compute: 1011001 XOR 0111011
7. 1100001
8. None of the other choices is correct
9. 1100110
10. 1100010
11. Let A, B, C be sets. Which set is the biggest? (that is, the set that contains the others)?
12. A - B
13. (A – B) – C
14. A – (B – C)
15. None of the other choices is correct